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LAND — AIR — WATER

JULY 9, 1938



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That was tough going until I remembered
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PEOPLE do buy cars because they are Hydraulic Brake equipped. Automobile salesmen will tell you so. In fact, Hydraulic Brakes are frequently the determining factor in a prospect's final selection of one car over another.

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smooth, *equalized* stop . . . are sturdy and long lived—require little servicing—and no lubrication. Is it any wonder they demand Hydraulic Braking in the new cars they buy?

Fleet owners demand Hydraulic Braking in trucks, too—for the same shrewd reasons. Hence, it is simple to arrive at a statement that is today almost a maxim: *Hydraulic Braking sells cars!*

HYDRAULIC BRAKE COMPANY
DETROIT, MICHIGAN

LOCKHEED HYDRAULIC BRAKES

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When Maxwells Were "Modern" -



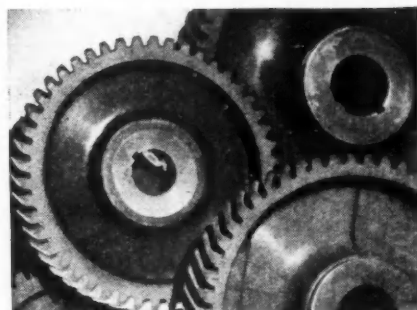
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At that time, this material already had been highly developed through creative research which started in 1905 with Dr. L. H. Baekeland's original experiments in phenolic resin chemistry.

Today, continued research is contributing refinements and improvements that constantly maintain the quality leadership of Bakelite Laminated timing gears.

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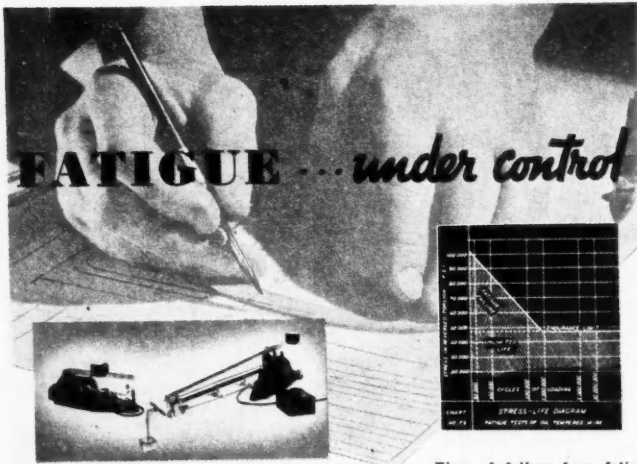
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Automotive Industries

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July 9, 1938



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AUTOMOTIVE INDUSTRIES

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Number 2

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July 9, 1938

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AUTOMOTIVE INDUSTRIES

Production

Schedule Modification Anticipated As Changeover Period Nears

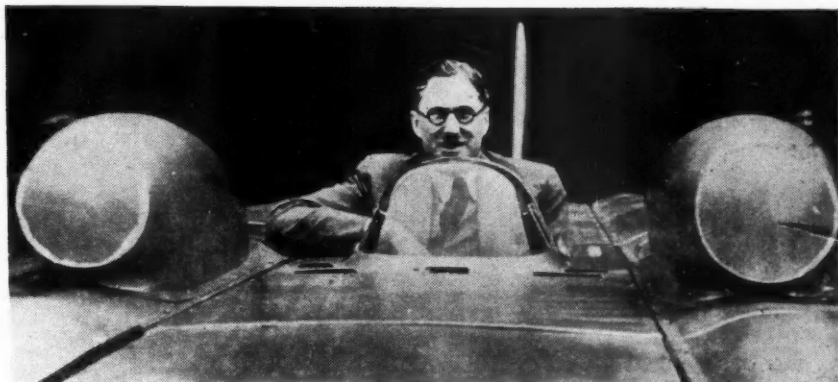
News from the final assembly lines of automotive producers for the week ending July 9 was considered to be constructive under prevailing conditions, in spite of the fact that total production for the week was expected to reach a level somewhat lower than that maintained throughout most of June.

Intervention of the July 4 holiday was the most important factor affecting the week's output, although some further modification of schedules also is anticipated during the month in view of the tapering off in production usually encountered as the annual changeover period draws closer. However, in view of the manner in which sales have been holding up during the past few weeks, it is expected that next week's production will be up nearer the average that will be maintained during the better part of July.

The past week's production, according to a preliminary check, is expected to total approximately 23,600 cars and trucks. Several producers extended the holiday period an extra day, but resumed final assemblies for the balance of the working week, while Ford's final assembly lines remained down for the week, although other departments were operating. The same was true at the Pontiac plant. Both expected to resume final assemblies next week.

Chevrolet took off an extra day after the holiday, but expected to make it up later in the week to maintain its current pace of approximately 10,000 cars and trucks. Other General Motors divisions, including Buick, Oldsmobile and Cadillac-La Salle were expected to bring this major producers total to slightly over 14,000 units for the week.

Chrysler divisions were in operation on their usual schedules, except for the holiday shutdown, and were



THUNDERBOLT BACK

Capt. G. E. T. Eyson has returned to this country with his world's record car;

now slightly changed, for new attempts at the speed mark he set last year on the Bonneville salt beds in Utah. See story on page 41.

expected to finish the week with an estimated output of close to 5000 cars and trucks. Among the independents, Packard, Hudson and Nash maintained their current schedules, with Studebaker reporting a drop to 100 passenger cars from the 1540 cars and trucks of the last week in June.

Official estimates of June car and
(Turn to page 45, please)

Labor

No Move from Lewis as Yet In UAW Internal Upset

Unless efforts to bring about an early peace within the administration of the United Automobile Workers Union are more successful than they appear to have been since the suspension of five officers by Homer Martin, UAW president, the struggle between the opposing factions for support from the rank and file membership will continue right up to the time of the trials of the suspended officers set for July 25.

Charges upon which the five will then be tried have been mailed to them, Martin has announced, but neither his office nor the suspended men would reveal the contents of the letters. From unofficial sources it is said that the charges were reported

to cover: refusal to cooperate with the 20-point harmony program recently adopted by the international executive board; obtaining money through the mails fraudulently; diverting union funds without authorization; talking to newspapermen; violation of the oath of office by attending local meetings since suspension on May 13. Since publication of these reported charges UAW headquarters has intimated that more serious ones have not been mentioned.

All but the first of the above-mentioned charges refer to alleged actions of the officers since their suspension and thus hardly could form the basis for the suspension. No mention, it is said, is made of collaboration with the Communist party in connection with union affairs as verbally charged by Martin shortly after the suspensions were announced. This latter development is significant in view of the publication since that time of an article in the *Saturday Evening Post* by Stanley A. High which outlines activities of the Communist party within the CIO, particularly the UAW, and traces a connection between that party and some of the suspended officers. Shortly after the appearance of the article Martin could not

(Turn to page 41, please)

Rubber Price Rise Saves Inventory Losses

*Advance in Crude Welcomed at Semi-Annual Accounting
—Tire Inventories Well Under 1937 Figure*

An eleventh-hour spurt in crude rubber prices saved the tire industry millions of dollars in inventory losses as tire manufacturers closed their books for semi-annual accounting June 30. Fearing that weak crude prices might necessitate further devaluation of crude rubber inventories on top of the heavy year-end losses taken at the close of 1937, several manufacturers recently had deferred dividend payments. Crude rubber closed Dec. 31, 1937, at 14 $\frac{3}{8}$ cents per lb., and the industry wrote off staggering losses. Crude continued to sag to a new four-year low of 10 $\frac{3}{8}$ cents per lb. in April. Prices were under 14 cents during June, but in the last week spurted, and on June 30 closed at 14 $\frac{3}{4}$ cents per lb., or a fraction higher than on December 31. This enabled tire companies to close their books for semi-annual statements on June 30 without showing new inventory losses. Crude prices opened July 1 at 15 $\frac{1}{4}$ cents with indications of further climbs as the 45 per cent restriction quota went into effect July 1. The quota had been 60 per cent for the second quarter of 1938.

To add to the optimistic tone sounded in the industry when crude prices climbed so encouragingly, manufacturers find tire inventories substantially lower than a year ago. On June 30, 1937, tire stocks exceeded 12,000,000 casings. Deliveries exceeded production by nearly 1,500,000 in April, May and June, cutting inventories on June 30, it is estimated, to under 9,500,000 casings.

First-half year replacement sales are estimated to have been about 13,000,000 casings. First half-year sales in 1937 were around 15,000,000 due to the heavy first-quarter buying

under the effect of two tire price increases. First-half year deliveries are believed to have been below dealer sales to consumers, for dealers have continued to liquidate their stocks. On the basis of first half-year sales, the industry is more confident than ever that they will have sales of 29,000,000 replacement units for the year. July and August are the heaviest tire-buying months of the year, and sales are now reported to be running substantially ahead of a normal seasonal rate.

Manufacturers probably will push up production during June and July. Smaller companies supplying only the dealer market have been exceptionally busy in June. Larger manufacturers whose production schedules were affected by the drop in original equipment orders, expect to see car manufacturers' orders for tires for 1939 model cars coming in during July and August. Against 22,700,000 original equipment tire sales last year, the industry had reconciled itself to a market for less than 11,000,000 this year, but with reports that car sales have picked up, industry leaders now are predicting a better figure before the year is ended.

War Department Awards Largest Peace-Time Plane Contract

The War Department awarded contracts July 1 for fighting airplanes and equipment totaling \$14,443,196—the largest peace-time order for equipment ever given in this country.

The contracts, announced by Col. Louis Johnson, acting Secretary of War, call for 98 new airplanes and extensive equipment.

The first of the contracts involves the procurement by option under existing contracts with the Boeing Aircraft Co. of 13 additional four-engined bombers which are to be an improved type of the so-called "flying fortresses." The cost of the order is \$3,174,802. Each will be powered by four Wright Cyclone engines. When these are completed, the army will have a total of 52 huge long-distance bombers.

The second contract, and the largest, is for 78 additional B-18-A bombardment airplanes at a cost of \$5,703,287. The War Department exercised an option with the Douglas Aircraft Co., Inc., in the procurement of these planes, which now increases to more than 250 the number of planes of that type purchased under the existing contract at a total cost of approximately \$15,000,000.

The B-18-A is a two-engined bomber attaining a speed in excess of 225 m.p.h. It is equipped with retractable landing gear, flaps, directional gyro and all other modern aircraft improvements. Each plane is powered by Wright Cyclone engines.

... slants

BOTTOM—C. L. McCuen, general manager of Oldsmobile, in giving his views that the current depression struck bottom, said: "America has ... been producing less than she has consumed. This has been true of automobiles ... The inevitable result is that production eventually must rise to meet an increasing rate of consumption. This, in turn, should cause a gradual improvement in the cycle of demand, consumption, production and employment."

FRAUDS—The U. S. District Court at Philadelphia has permanently enjoined two men from selling securities in violation of the fraud provisions of the Securities Act of 1933. It was charged that the defendants had secured possession of a large number of stock certificates of corporations which had gone through receivership and reorganization, such as Studebaker Corp. of New Jersey and Willys-Overland Co., which worthless and obsolete certificates they attempted to deliver after inducing people to buy the stock of the successor corporations which have similar names.

SAFETY—Twenty-four research fellowships and tuition scholarships



Globe Photo

MOBILE P.A.

A new high-powered mobile public address system recently procured by the Signal Corps of the Army as it was demonstrated before War Department officials. The new unit, said to be one of the largest of its kind in the United States, was used for the first time on July 3 when President Roosevelt delivered his address at Gettysburg.

New Passenger Car Registrations

*New car registrations turned downward again with May showing a decrease over April of 13,110 units, or approximately 7 per cent. In comparing May this year with May, 1937, a decrease of about 55 per cent is shown.

As indicated in the table below, per cent change for the first five months of 1938 as compared with the same period in 1937 was minus 50.0. Comparison of the seven months of the model years reveal 1938 total behind by 45.5 per cent.

	MAY	APRIL	MAY	FIVE MONTHS		Per Cent Change, 5 Months, 1938 over 1937	Per Cent of Total Five Months		SEVEN MONTHS MODEL YEAR		
	1938	1938	1937	1938	1937		1938	1937	1938	1937	Per Cent Change
Chevrolet	42,661	46,718	80,852	196,660	332,003	- 40.7	24.78	20.90	296,935	472,349	- 36.7
Ford	34,454	36,552	91,106	168,355	395,180	- 57.3	21.21	24.87	214,152	483,911	- 55.7
Plymouth	27,090	26,710	47,916	108,158	209,786	- 48.4	13.63	13.20	156,511	297,079	- 47.2
Buick	14,358	16,207	21,307	65,555	81,264	- 19.4	8.26	5.12	98,484	118,179	- 16.6
Dodge	9,713	10,742	26,319	44,880	115,028	- 61.0	5.65	7.24	69,792	156,099	- 55.2
Pontiac	8,689	9,964	23,400	41,278	90,945	- 54.5	5.20	5.72	63,549	122,301	- 48.0
Oldsmobile	8,614	9,065	21,557	38,889	83,684	- 53.4	4.90	5.27	58,438	107,324	- 45.6
Packard	4,650	5,066	11,160	21,029	46,539	- 54.8	2.65	2.93	31,593	60,706	- 48.0
Chrysler	4,502	4,795	9,145	20,783	37,954	- 45.2	2.62	2.39	32,858	50,036	- 34.4
Hudson	3,497	4,026	9,015	17,280	42,178	- 59.0	2.18	2.65	26,310	58,717	- 55.1
De Soto	3,231	3,557	7,644	15,535	31,396	- 50.4	1.96	1.98	24,501	40,350	- 39.3
Studebaker	2,836	3,170	7,550	14,138	32,801	- 57.0	1.78	2.06	21,597	44,737	- 51.8
Nash	2,899	3,154	7,653	13,484	30,082	- 55.0	1.70	1.89	20,093	37,734	- 47.0
Lincoln	1,575	1,638	2,732	7,778	11,523	- 32.5	.98	.73	11,170	15,206	- 26.5
La Salle	1,359	1,656	3,258	6,075	12,532	- 51.5	.77	.79	9,444	16,938	- 44.2
Willys	1,023	1,176	5,803	8,805	22,706	- 74.4	.73	1.43	10,169	24,382	- 58.3
Cadillac	1,078	1,056	1,439	4,760	5,521	- 13.7	.60	.35	5,999	7,834	- 23.4
Graham	356	394	1,416	2,111	6,101	- 65.4	.27	.38	3,444	8,578	- 59.9
Hupmobile	121	122		488			.06		713	22	
Pierce-Arrow	2	4	14	13	131	- 90.0		.01	27	231	- 88.3
Miscellaneous	107	153	233	653	1,361	- 52.1	.07	.09	958	3,212	- 70.2
Total	172,815	185,925	379,519	793,707	1,588,715	- 50.0	100.00	100.00	1,158,717	2,125,927	- 45.5
Chrysler Corp.	44,536	45,804	91,024	189,356	394,164	- 52.0	23.66	24.81	283,662	543,566	- 47.9
Ford and Lincoln	36,029	38,190	93,638	178,133	406,703	- 56.6	22.19	25.60	225,322	499,117	- 55.0
General Motors	76,759	84,666	151,813	353,217	605,949	- 41.8	44.50	38.14	534,629	844,925	- 36.6
All Others	15,491	17,265	42,844	75,001	161,899	- 58.7	9.45	11.45	114,904	238,319	- 51.8

* Does not include returns from Wisconsin. All data are comparable.

in safety education valued at approximately \$11,500, will be awarded by New York University's new national center for safety education to graduate students enrolled for the 1938-39 academic year in the School of Education, it was announced at the office of the secretary of the University.

A.M.A. Official Sails to Study Export Car Market

George F. Bauer, export manager of the Automobile Manufacturers Association, sailed July 2 to survey European market conditions for American motor vehicles.

While in Europe, Mr. Bauer will meet with automotive officials to discuss plans for strengthening contacts to aid expansion of outlets for American production.

The outlook for American car and truck sales abroad, according to motor industry's export leader, is "brighter than in many lines of business, but account must be taken of the fact that imports in general into the United States have dropped, thereby lessening dollars available abroad for the purchase of American products.

"On the other hand, tourist travel appears to have remained at a peak and a large amount of dollar ex-

change may be expected to continue to be available from this source for the purchase of American motor cars and other goods."

United Aircraft Corp. Takes Over Export Firm

United Aircraft Corp. announced that as of July 1, 1938, it has taken over the business and assumed the liabilities of its former subsidiary, United Aircraft Exports Corp., and that the exports operation will, in the future, be conducted as a division of United Aircraft Corp. Owing to the increasing importance of United's license and sales negotiations in Europe, Mr. Thomas F. Hamilton, former president of United Aircraft Exports Corp., has resigned his position to become the European representative of the corporation. Mr. Hamilton, who was the founder of the predecessor company of the Hamilton Standard Propellers Division of United more than twenty-five years ago has been associated with the export activities of this corporation and its predecessor, United Aircraft & Transport Corp. practically since the establishment of an export unit in 1929.

When Mr. Hamilton resigned, Mr. J. Reed Miller, vice-president, became president of United Aircraft

Exports and now becomes vice-president and general manager of the export division of this corporation. Mr. Miller has been identified with the aircraft industry for the past thirteen years. Commencing in 1925 he served Standard Steel Propeller Company and Hamilton Standard Propeller Corp. in the capacity first of auditor and then as treasurer, resigning in 1932 to become assistant secretary and assistant treasurer of United Aircraft Exports, Inc. He was elected vice-president of the Export Corporation in 1936.

Olds Awards Contest Prizes

Checks aggregating \$10,000 have been distributed to the 50 winners in Oldsmobile's automatic safety transmission prize contest which the company conducted through its national dealer organization during May. Entrants were required to drive an Oldsmobile Six or Eight equipped with the automatic safety transmission and to write a 200-word comment upon their reactions.

The entries were judged by Richard Harfst, general manager, the Automobile Club of Michigan; W. E. Anderman, publisher, Detroit Times, and Joseph Geschelin, Detroit technical editor, AUTOMOTIVE INDUSTRIES.

Automotive Safety Foundation Reports on Traffic Fatalities

The greatest single monthly reductions in traffic fatalities since 1926, when such figures first became available, were reported for May by the Automotive Safety Foundation in a report to its trustees based on data of the National Safety Council, which showed a decrease of 27 per cent as compared with the same month of last year.

For the past seven months a total of 3,780 lives were saved on streets and highways, as compared with the same months a year ago. Of this total, 2,900 lives were saved during the first five months of 1938, the report shows, in spite of estimated increases in gasoline consumption and total automotive mileage.

Of the 41 states reporting, 37 showed decreased highway fatalities.. The five-month record shows Pennsylvania leading in the number of lives saved with 361, a decrease of 38 per cent; Vermont showed a decrease of 41 per cent, with 15 lives saved, compared with the first five months of 1937.

Of 415 cities reporting, 309 showed either fewer deaths or no change as compared with the first five months of last year. Detroit led the list of cities with 75 lives saved.

The following table summarizes the report:

TRAFFIC FATALITIES BY MONTHS			
	1937	1938	Per cent change in gasoline consumption (minus)
January	3,100	2,600	6.28
February	2,490	2,040	3.36
March	2,800	2,180	1.96
April	2,580	2,090	*
May	3,120	2,280	*

* Estimates not yet available.

Percentage reductions in the various sections of the country were:

Eastern States: minus 27 per cent; South Atlantic States; minus 16 per cent; North Central States: Blank—tools of tomorrow— .. minus 25 per cent; South Central States: minus 13 per cent; Mountain States: minus 4 per cent; Pacific Coast States: minus 15 per cent.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

Foreign Notes

The Automobile Club of Great Britain now has 300 members, while that of France has nearly 1500.

July 9, 1938

The member of the French assembly who opposed a tax on motor vehicles was not reelected, his place being filled by an enthusiastic chauffeur.

The French military authorities have decided that motor vehicles will be of great assistance in time of war, and have laid plans to register such vehicles as are suited to their needs and call them into service if necessary.

From *The Horseless Age*, July, 1898.

Ford Granted Patent on Rear-Engined Car

The patent office has granted to Henry Ford a patent for a V-type, eight cylinder rear-engined automobile. The patent application describes a compact assembly of the engine, transmission, differential and related mechanism set over the rear axle.



W. M. PHILLIPS of the general chemistry department of General Motors research division has been elected national president of the American Electroplaters Society. Mr. Phillips has undertaken the project of a world congress on electroplating to be held at Asbury Park, N. J., next year.

B. C. HEACOCK, president of Caterpillar Tractor Co. has been appointed chairman of the manufacture committee of the U. S. Chamber of Commerce, and WALTER HARNISCHFEGGER, president of the Harnischfeger Corp., Milwaukee, has been appointed to the committee on national defense.

A. L. FRANK, president of Studebaker Export Corp. has also been appointed to the U. S. Chamber of Commerce as a member of the foreign commerce committee.

SAMUEL P. LYLE, extension agricultural engineer, U. S. Department of Agriculture, was inaugurated president of the American Society of Agricultural Engineers at the thirty-second meeting of the Society at Asilomar, Pacific Grove, Calif., June 29.

PRESCOTT B. JENSEN, metallurgist, Fort Wayne works, International Harvester Co., has been transferred to the new Indianapolis engine plant as head of the metallurgical department. HENRY E. ELFNER, has been sent to Indianapolis as resident engineer. GUY A. BAKER, engine inspector, has also been sent to Indianapolis to serve as assistant resident engineer. RUDOLPH T. RUDOLPHSON, assistant chief inspector, has been transferred to Indianapolis in the same capacity. Mr. Rudolphson was succeeded at the Fort Wayne plant by SPERRY A. FRY, former head of the salvage department.

WILLIAM J. GOTLIEB has been re-elected president of the Automobile Club of New York. This is his second term. J. R. CROSSLEY, vice-president, and WALTER B. FODEN, secretary and treasurer, were also returned to office.

F. ELLIS JOHNSON, dean of the college of engineering, University of Missouri, has been appointed dean of the similar school at the University of Wisconsin in Madison. Dean Johnson fills the vacancy caused by the retirement of Dean F. B. Turneure.

CALVIN VERITY has been elected executive vice-president and general manager of the American Rolling Mill Co., Middletown, Ohio. For the same company, W. W. SEBALD has been named vice-president and assistant general manager.



ARCHIE M. ANDREWS

... one-time chairman of Hupp Motor Car Co., and for 20 years one of the largest stockholders of the company, died June 21 after a brief illness, in his home in Greenwich, Conn.

With brilliant strategy he took control of the company in 1934, but lost his hold a year later after a bitter fight in which the news of the company's internal troubles made newspaper headlines. Only a few months before his death he disclosed to AUTOMOTIVE INDUSTRIES the outline for a plan to return to the automotive field through a combine of accessory manufacturing concerns, backed by the fortune he recouped after the 1929 debacle swept away his estimated wealth of more than \$50,000,000.

Chairman of Dictograph Products Co., he directed the business of Packard electric shaver, and broke the "patent monopoly," as he called the Schick razor concern. Scores of other electric razors were soon in the market following his legal victories against Col. Jacob Schick.

His first job paid 10 cents a day as a photographer's assistant. He sold papers in front of the Chicago Herald building, and in 1920 bought the building in true Horatio Alger tradition.

His formula for success was to "simply find a seller, then find a buyer who will meet the price—plus a commission." He had great faith in the automotive industry, and believed that inventive genius would soon develop mechanisms which would obsolete conventional parts and vehicle design.

Casing Exports

May exports of automobile tire casings valued at \$531,694 and representing a decrease of 27.9 per cent in value over May, 1937, exports, have been reported by the Commerce Department's Bureau of Foreign and Domestic Commerce.

Exports of 40,311 inner tubes during May reflected a decrease of 28.7 per cent in volume.

Automotive Industries

Eyston Plans to Break Own Record

*Arrives in United States with Improved "Thunderbolt"
For Speed Trials Later This Month*

Condition of the Bonneville Salt Flats, Utah, permitting, Capt. George E. T. Eyston, consulting automotive engineer and race driver, will try for 333 m.p.h. this month. The flats are a sea of salty mud, as the result of unseasonal rains, he learned upon his arrival, July 4, from England. The Thunderbolt, his 3600 hp. racer, is on its way to Utah, and he planned to fly West July 5 to superintend the unpacking and fitting of his 34 ft. 5 in. behemoth.

The Thunderbolt has a larger tail or fin, and is now 4 ft. longer than it was when he made the new world mark of 312.2 m.p.h. on the Flats, 100 miles from Salt Lake City. The engine plant is substantially the same as he used last time—two 12-cylinder Rolls-Royce Vee units, of 152 mm. bore and 167 mm. stroke. The engines have a total displacement of 73.164 cc.

Improved streamlining and a redesigned clutch, Captain Eyston told AUTOMOTIVE INDUSTRIES, and slightly less weight despite the car's increased length, may help him to achieve his hope of five-and-a-half miles a minute over the one-mile measured distance on the straight-away. The four front and two rear wheels are sprung on coil springs, and the leaf-spring suspension has been discarded.

Except for the larger tail and smoother surfaces on the body of the car, it resembles the Thunderbolt he used last year. His cockpit has been slightly changed to improve the faring, and the two "breathers" to supply air to the engine have been redesigned to admit more air. The cockpit is entirely enclosed, and he will use a fresh-air mask.

Hydraulically operated wings in the tail have been installed to start deceleration. Although such a device was on last year's car, he had taken them off before the run because he felt that they were not satisfactory.

Improved Lockheed brakes, with a servo booster, have been designed, and an improved brake lining, capable of withstanding temperatures of 1000 deg. Fahr., have been installed in the disk type of brakes. The coefficient of friction tends to increase as the lining heats up, preventing fading when brakes are applied.

The Thunderbolt weighs 7 tons (long ton, 2240 lb.), has a front

track of 5 ft. 4 in., and a mean rear track of 5 ft. 7 in. Single tires are on the four front wheels, and duals are used on the two rear, or drive, wheels. Wheels have a diameter of 44 in.

The car's over-all height is 46 in., about $\frac{1}{2}$ in. lower than the 1938 Thunderbolt.

"In my opinion, we have reached about the limit in design for speed in a large machine," Captain Eyston said. "We have lightened everything possible, and have used only the best automotive alloys known to the industry today.

"About 350 m.p.h. seems to me the limit for a car of this size, unless some genius shows some marked improvement in engine power-weight ratio. Even then, the limiting factor might well be the tractive ability of the tires. We are giving them about all they can stand, and giving the rest of the machine about all it can stand, as it is," he remarked.

He ventured the opinion that vapor-cooling might result in some gain. Forty gallons (British) of water are used in the radiator. "We could get rid of some of that weight with vapor-cooling, but we did not have time to develop such a system for this car," he said.

Labor

(Continued from page 37)

be reached for comment, although it was indicated at UAW headquarters that he probably would have nothing to say.

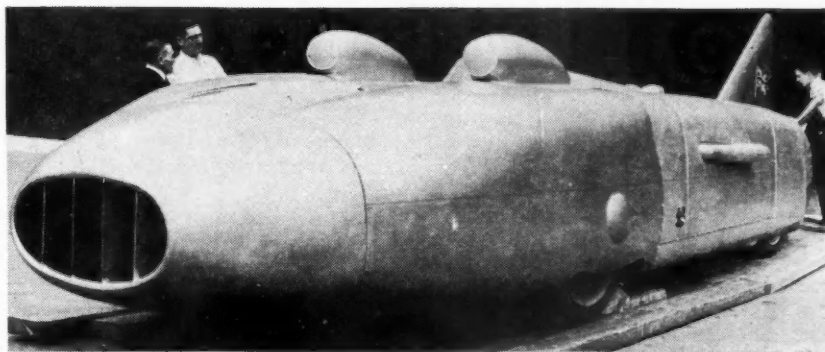
The time set for the trial, July 25,

comes a day after the closing of the convention of "Labor's Non-Partisan League" in the affairs of which the Communists have also had a hand, according to the High article. Whether developments at the convention will have any effect on the trials still remains to be seen.

To date John L. Lewis, CIO chairman, has taken no steps to mediate the internal battle, although heads of more than 30 UAW locals, who demanded immediate peace and restoration of the suspended officers, indicated that they would demand his intervention if peace could not be restored in any other way. After mailing the charges against the officers Martin flew to Washington for a conference with Lewis, but announced afterward that neither the CIO chairman or Philip Murray, CIO vice-chairman, who sat in on the conference, had any suggestions to make for settlement of the dispute.

Martin was well received by UAW audiences in Flint and Detroit where he made speeches on July 4. His speeches were largely demands that these cities take steps to care for unemployed, although he apparently had the internal situation in mind when he declared that "we do not intend to be tied to a group seeking to do the bidding of someone beyond the borders of this country who doesn't have the interest of the workers at heart."

A further appeal to the rank and file was seen in Martin's opening on July 5 of a series of 13 radio broadcasts in which he planned to "give a constructive and militant statement of the position of the UAW to the membership as a whole, necessary this summer because so many members are unemployed or on WPA and do not attend regular union meetings."



Side-view of Capt. Eyston's Thunderbolt, showing a smaller radiator opening, improved smoothness of body surfaces, and improved design of "breathers," on either side of the enclosed cockpit. The caps on the "breathers" are removed before the engines are started by compressed air. The

designer-racer is seen second from the left. When driving he sits low in the completely enclosed cockpit. His eye level, about 40 in. from the ground, gives him a view of a little more than 2 miles to the horizon. He drives with his eyes focused about $\frac{3}{4}$ or $\frac{1}{2}$ a mile ahead of the car.



BUSINESS IN BRIEF

Written by the Guaranty Trust Co., New York

Earlier gains in business activity were maintained last week. The *Journal of Commerce* index stands at 69.5, unchanged from the preceding week's level, as against 101.3 a year ago. Dunn & Bradstreet estimate that retail sales last week were 4 to 8 per cent larger than a week earlier and 10 to 18 per cent below the level for the corresponding period last year. Wholesale business is placed 8 to 18 per cent below the comparable figure for 1937.

A further slight rise in railway freight traffic occurred during the week ended June 25. Loadings for that period totaled 558,937 cars, showing an increase of 3368 cars, or 0.6 per cent above the total for the preceding week, but a decrease of 211,008 cars, or 27.4 per cent below that for the corresponding period last year. The Shippers' Regional Advisory Board estimate that loadings in the third quarter of the year will be 19.6 per cent below the level a year ago.

Production of electricity by the electric light and power industry for the week ended June 25 was the largest since the early part of March. In comparison with the figure for the corresponding period last year, the current total shows a decrease of 9.8 per cent, the smallest percentage decline below the 1937 figure since the week ended April 9.

Debits to individual accounts re-

ported by banks in leading cities for the week ended June 22 were 10 per cent below the total for the preceding week and 13 per cent below that for the corresponding period last year.

The lumber industry during the week ended June 18 stood at 58 per cent of the 1929 weekly average of production and 57 per cent of average 1929 shipments. Production was the largest for any week so far this year. Both new business and shipments were 4 per cent below output.

Average daily crude oil production for the week ended June 25 amounted to 3,083,900 barrels, showing a decline of 53,400 barrels below the figure for the preceding week. Output for the corresponding period last year averaged 3,529,600 barrels daily.

After three successive weekly advances, Professor Fisher's index of wholesale commodity prices declined slightly during the week ended July 2, standing at 80.9, as against 81.1 a week earlier and 81.0 two weeks earlier.

Reserves of member banks of the Federal Reserve system increased \$119,000,000 during the week ended June 29. The monetary gold stock rose \$5,000,000 and money in circulation \$26,000,000, while the amount of Federal Reserve bank credit outstanding declined \$1,000,000. Excess reserves of member banks on that date were estimated at \$2,900,000,000, showing an increase of \$120,000,000 for the week.

Plant Notes

Western Machine Co., Milwaukee, manufacturer of automatic screw machine products and supplier to numerous passenger car, truck and tractor plants, is increasing its floor space about 10 per cent by 2500 sq. ft. Capitalization has been increased from \$25,000 to \$50,000 to accommodate the expansion which includes new automatic equipment.

Ground was broken June 29 for a \$125,000 addition to the Windsor plant of the Chrysler Corp. of Canada. John D. Mansfield, president, said the addition is intended to pro-

vide more efficient facilities for turning out Chrysler, De Soto, Dodge and Plymouth cars. The new plant is expected to be ready in September, when production of the 1939 models will start.

Parts of the defunct Auburn automobile plant and the administration building at Auburn, Ind., have been sold to the Dallas-Winslow Co., Cincinnati. The plant sale was for \$85,000 and the administration building \$25,000. Parts of the Los Angeles plant were sold to the Hamlin company, of Los Angeles, for \$7,250.

Sealed Power Corp., Muskegon, Mich., has completed a new two-story warehouse of 61,260 sq. ft., which will house all of its products, shipping department and the direct mail and printing department.

The Simonds Saw and Steel Co. is moving into its new windowless plant at Fitchburg, Mass. The plant was built in 1931 but no attempt was made to move into it because of the business depression. Moving and installation of machinery will require from eight to twelve months.



The Torrington Mfg. Co., Torrington, Conn., has released a bulletin describing the advantages and features of its **segment and clutch type spring making machines**.*

A new catalog on **platform and special trucks** has been prepared by the Fairbanks Co., New York. It is designated at No. 52-20.*

"Production Road" is the title of a rather elaborate brochure prepared by Twin Disc Clutch Co., Racine, Wis. It pictures and describes various installations of **twin disc clutches** in agricultural, industrial, constructional, and marine applications.*

Bound Brook Oil-Less Bearing Co., Bound Brook, N. J., has published Vol. 1, No. 1, of a monthly pamphlet called **The Reservoir**. It is intended for distribution to "engineers generally and designing engineers particularly."*

Wyckoff Drawn Steel Co., Pittsburgh and Chicago, recently brought out a bulletin describing its "**Ledloy**" cold drawn steel.*

"How the Average Purchaser Has Been Given \$9.57 Worth of Free Mileage in Each Tire" is the title of a pamphlet prepared by the Goodyear Tire & Rubber Co.*

Latest bulletin issued by Joseph T. Ryerson & Son, Inc., describes the company's line of Timken **mechanical tubing**. Included are physical property specifications, tolerance charts, numerical equivalent tables and other useful data.*

The Union Drawn Steel division of Republic Steel Corp., Cleveland, has announced a 24-page handbook "**Cutting Costs with Cold Drawn Steel**." This is a non-technical discussion of the results of cold drawing and their utilization in the manufacture of steel parts.*

DeHaviland Gets \$300,000 Order for 200 Fuselages

The DeHaviland Aircraft Co. of Canada is reportedly about to undertake manufacture of fuselages for 200 tiger moth planes intended as trainers for the Royal Air Force in Britain. The parts order was understood to have been received from the parent company in England and is believed to amount to about \$300,000.

Automotive Metal Markets

Elimination of Artificiality and Top Heavy Prices Seen as Prelude to Uptrend in Steel Buying

How the competitive situation in the steel market will shape up, now that the moorings of many old-established differentials no longer serve as a factor of price equalization, has most purchasing agents for automobile plants and parts makers as well as many steel company sales executives guessing. Uncertainty over this, however, is not keeping a single dollar's worth of business from being placed. Virtually all steel producers have brought their prices into line with those of their competitors, who had made formal announcements of price cuts. While there is some talk of one of the large automobile manufacturers planning to stock up on steel in the near future, a general buying movement is hardly looked for before the picture of potential car sales has been somewhat more developed. There are also those who, mindful that the downward change in steel prices came overnight and become immediately effective, reckon with the possibility of just as sudden a price change in the opposite direction, and they, too, may be considered as eager to take advantage as much as possible of prevailing prices. The few, who see in one price cut the possibility of another, are decidedly in the minority. There is no doubt that many of the smaller steel companies face the need of completely reorganizing their markets and methods to cope with the new order of steel pricing. A Michigan producer's new price schedules retains the principle of differentials, the Detroit delivered price being \$2 a ton above the Pittsburgh base price. It will take some time before much of the prevailing confusion is cleared up and competitive order reestablished. On the whole, however the elimination of top-heavy prices on some products and of a certain amount of artificiality has cleared the atmosphere and a steady uptrend in buying is looked for from now on. This is always an off-week in the steel calendar and for its five-day period the American Iron and Steel Institute estimated 22.4 per cent of ingot capacity operating.

Only a few weeks ago, copper producers were suspending operations, pending better demand. Toward the end of June buying turned suddenly heavy and, as a result, the price for electrolytic rose from 9 to 9½ cents, more than 90,000 tons having changed hands in June, the highest

tonnage disposed of in any one month in a year-and-a-half. The better feeling in Wall Street had much to do with the market's improvement. Brass and copper rolling mills as well as copper wire manufacturers raised the prices for their products accordingly. Scrap was also higher. A good export business was done on a 10-cent basis. Later the export price moved slightly higher, and in the domestic market some holders asked 9¾ cents at the resumption of business on Tuesday.

Tin also edged forward. End-of-the-month statistics showed an increase by more than 1000 tons in the world's visible supply, but the bulls are in the saddle at London. On Tuesday spot Straits tin was quoted at 43⅞ cents, compared with 37½ cents a month ago.

The lead market held substantial gains made during a buying flurry late last week, when storage battery manufacturers took the lead in covering their needs. Zinc has been taking its cue from the lead market of late and smelters raised their prices fractionally, although consuming demand is still rather time. Zinc die-casting alloy has been advanced to 7¾ cents.—W. C. H.

Greater Share in Auto Parts Seen For Buffalo

Prospects that Buffalo, N. Y., automotive parts and supplies industries will obtain a much larger share of the business in the Detroit automobile area is foreseen by authorities in that city as the result of abandonment of the price differentials between large steel producing centers.

Buffalo, made a basing point by Bethlehem Steel for steel sheets and having an advantage of low cost water transportation to Detroit, may gain a distinct advantage over Pittsburgh in doing business with the automobile industry, observers say.

So, too, would the automotive parts and supply makers, since they will buy steel on a more favorable basis than formerly. Flat rolled steel products now may be purchased from Buffalo mills without the Pittsburgh-plus freight rate, making the price considerably lower.

George E. Emmons

George E. Emmons, 80, formerly manager of the Schenectady works of the General Electric Co. and later vice-president in charge of manufacturing, died in Pasadena, July 1.

Mr. Emmons devoted more than a quarter century directing the development of one of the world's biggest electrical plants as general manager of the Schenectady works.

New Truck Registrations

*Total new truck registrations continue to show losses with May revealing 2466 units or about 7 per cent less than April. In comparing May this year with May, 1937, a loss of 31,768 units or approximately 50 per cent is shown. As indicated in the table below, the per cent change in the totals for the first five months of 1938 as compared with the same period in 1937 amounted to minus 41.5.

	May	April	May	FIVE MONTHS		Per Cent Change, 5 Months 1938 over 1937	Per Cent of Total Five Months	
	1938	1938	1937	1938	1937		1938	1937
Chevrolet	10,659	11,719	20,146	53,739	60,796	- 33.5	33.28	29.25
Ford	8,918	9,287	19,884	44,902	94,841	- 52.6	27.81	34.34
International	4,278	4,810	7,071	22,608	30,704	- 26.3	14.00	11.12
Dodge	3,171	3,575	5,893	16,104	24,742	- 34.8	9.97	8.96
G. M. C.	1,810	1,917	4,416	8,841	18,945	- 53.4	5.47	6.86
Plymouth	862	757	1,447	3,418	4,594	- 25.5	2.12	1.66
Diamond T	360	393	816	1,808	3,902	- 53.7	1.12	1.41
Mac	382	366	579	1,571	2,386	- 34.1	.97	.86
White	323	321	673	1,528	2,713	- 43.6	.95	.98
Reo	287	251	411	1,219	1,922	- 36.6	.75	.70
Studebaker	221	184	701	868	2,254	- 61.5	.54	.82
Willys-Overland	168	175	77	831	442	+ 88.0	.51	.16
Autocar	193	119	197	646	846	- 23.6	.40	.31
Federal	93	136	294	592	1,192	- 50.4	.37	.43
Brockway	159	127	183	493	724	- 31.9	.31	.26
Divco	150	158	178	474	542	- 12.6	.29	.20
Hudson	68	78	489	403	2,143	- 81.4	.25	.78
Indiana	44	47	110	205	647	- 68.4	.13	.23
Stewart	45	43	120	165	575	- 71.3	.10	.21
F. W. D.	14	35	67	159	183	- 13.0	.10	.07
Pontiac	32	32	119	119			.07	
Sterling	25	26	27	93	140	- 33.6	.06	.05
Stutz Pak-Age Car	5	4	59	82	251	- 67.3	.05	.09
Miscellaneous	139	112	136	615	701	- 12.1	.38	.25
Total	32,206	34,672	63,974	161,481	276,185	- 41.5	100.00	100.00

* Does not include returns from Wisconsin. All data are comparable.

Ourselves and Government

A weekly check list of legislative, executive and judicial actions affecting the automotive industries. First appeared in July 25 issue, p. 831. Corrected to July 7

CONGRESS

Adjourned June 16, *sine die*. All members of House and 36 Senators retire or face election in Autumn.

Legislative Legacies

MONOPOLY INVESTIGATION. Passage of O'Mahoney resolution (S.J. Res. 300) set up temporary National Economic Committee of 12 members to investigate concentration of economic power—monopoly.

Held first meeting July 1 and named Senator O'Mahoney as chairman, Representative Hatten Summers, Democrat of Texas, as vice-chairman, and Leon Henderson, WPA economic adviser and former head of NRA Research and Planning Division, as secretary. Instructed the six executive departments represented on the committee to prepare subject which each department wants scrutinized and laid plans to pair off executive department representatives with members of the Congressional delegation. In effect, the 12-member committee will be divided into six subcommittees, each having power of subpoena if full committee so decrees.

William O. Douglas, chairman of the Securities and Exchange Commission and a member of the group, this week disclosed that steel and rubber were among basic heavy industries being seriously considered for investigation by committee.

Investigation will probably begin about Sept. 1. Committee has power of subpoena and \$500,000 to spend. Will report to next Congress.

AIRLINES. Civil Aeronautics Act, 1938, introduced by Senator McCarran (S. 3845) creates a Civil Aeronautics Authority with broad administrative and regulatory powers over air commerce. Includes creation of Air Safety Board. Signed by President June 23, who will probably soon announce appointments. Mentionees include Edward P. Warner, former assistant secretary of the Navy for Aviation, and past president of the Society of Automotive Engineers.

WAGES & HOURS. Originally introduced by (then) Senator Black of Alabama. (S. 2475) provides for administration by Wage and Hour Division in the Department of Labor, and appointment of Industry Committees to make recommendations for specific industries. Applies to most industries in interstate commerce. Signed by President June 25, becomes effective Oct. 24. President to appoint administrator.

DEPARTMENT OF LABOR

AIRCRAFT LABOR. Walsh-Healey Government Contract Board has given interested persons 14 days from June 24 (later extended to July 25) in which to object to the proposed minimum wage of 60 cents an hour for a 40-hour week in the aircraft manufacturing industry. Government contracts would be denied manufacturers not adhering to such standards after approval. Objections have been filed but the board declines to make such information public except at hearings.

CONTRACTS totaling \$830,841.92 for transportation equipment awarded by contract board during week ending June 30. Largest contract awarded to International Harvester Co., for \$403,875 worth of motor trucks to be furnished the Post Office Department. Eclipse Aviation Corp., was next with a \$159,971.90 contract for supplying the Philadelphia Navy Yard with starter parts and tools. Other contracts included: \$10,185.34 to General Motors, Chevrolet Division, for automotive equipment and trucks for the Agriculture Department;

\$14,022 to International Harvester for trucks for the Resettlement Administration; \$33,948 to Autocar Sales & Service Co. for War Department trucks, and \$22,760.24 to the White Motor Co., Cleveland, also for War Department trucks.

LABOR RELATIONS CASES

FORD vs. N.L.R.B.: Last report A. I., June 25, p. 828.

Attorneys for the Ford Motor Co. on Thursday asked the Supreme Court to review a decision of the Circuit Court of Appeals which permitted the National Labor Relations Board to reopen the case involving the River Rouge plant.

Trial Examiner Tilford E. Dudley on Thursday recommended to the National Labor Relations Board that the Ford Motor Co. at its St. Louis assembly plant reinstate 192 employees discharged or refused jobs allegedly because of union activity that it grant sole collective bargaining rights to the United Automobile Workers of America and that it disestablish the Liberty Legion of America, Inc.

FISHER BODY. The NLRB has called an election at the Oakland (Calif.) Fisher Body, Oakland parts, and Chevrolet Oakland divisions of the General Motors Corp. to allow 1200 hourly-paid employees to choose between the UAW and an affiliate of the AF of L's machinist union. Or, says the board, the workers can vote for neither. Date not fixed but election must be held not later than July 15.

ELECTRIC AUTO-LITE CO. Bay City, Mich., ordered by the NLRB to disestablish the Bay Federation, an independent labor organization, as an employee representative. The board contended that the federation was a continuation of the Bay Cooperative Works Council, held to have been company dominated. Company also ordered to cease giving effect to a contract made between the company and the federation on Sept. 20, 1937.

HUDSON & TERRAPLANE SALES CORP. of New York City. NLRB announced July 6 that it had certified Local 259, International Union of United Automobile Workers of America (C.I.O.), as sole bargaining agency for manual workers of this corporation.

DEPARTMENT OF JUSTICE

MONOPOLY. Federal Grand Jury in South Bend returned indictments May 28 against approximately 60 executives of General Motors, Ford, and Chrysler; Commercial Credit Co., Universal Credit Co., and General Motors Acceptance Corp., charging conspiracy to violate Sherman anti-trust acts.

Bonds of \$2,500 each have been filed by 18 individual defendants connected with General Motors. No action so far by other corporations or individuals indicted. Similar case dismissed in Milwaukee by Federal Judge Geiger Dec. 17 last (see A.I.—Jan. 15, 1938. Last detail report A.I.—June 11, 1938).

SECURITIES COMMISSION

CLARK EQUIPMENT CO. has withdrawn its objection to public disclosure of a portion of Item 8 in its report on Form 10-K for 1937.

WAR DEPARTMENT

Authorized by Congress to spend two million dollars in next five years for "educational orders" to industry, to facilitate industrial mobilization in time of war. See

article p. 804, A. I., June 18. Army officials attempting to find funds to administer the order.

Authorized to spend \$2,000,000 on development of autogyro and other types of rotary-winged aircraft under the Dorsey bill approved July 1 by President. Bill sponsored in the House by Representative Frank J. G. Dorsey, Democrat, of Philadelphia.

Last week awarded contracts for 96 combat planes, 276 engines and a variety of aircraft parts and equipment. Total cost: \$14,443,196.

TREASURY DEPARTMENT

PROCUREMENT Division has advertised for bids on 129 trucks, 72 tractors and a wide range of road building machinery. Four Government agencies including WPA, FSA and NYA have asked for the equipment.

MOTOR CARRIER BUREAU

On June 14 the I.C.C. issued an order postponing effect of previous order relating to maximum hours of service of motor-carrier employees from July 1 to August 1, 1938. (Ex Parte No. MC-2).

FEDERAL TRADE COMM.

INVESTIGATION under the Withdraw-Minton Resolution (M.J. Res. 351) proceeding under direction of Dr. Francis Walker of F.T.C. to determine alleged "extent of monopolistic price-fixing and other monopolistic practices engaged in by automobile manufacturers, and alleged extent to which any anti-trust laws are being violated." Field workers interviewing dealers in a number of cities. No information available on progress or duration of investigation.

VS GENERAL MOTORS on question of forcing dealers to purchase parts and accessories from G.M. sources only. Hearings began July, 1937.

Dealer testimony recently taken in Texas. Hearings to be resumed in New York, July 26. Everett Haycraft is FTC attorney in charge.

ADVERTISING. F.T.C. cited Ford and General Motors in July, 1937, complaining of false and misleading representations in advertising prices of automobiles.

FTC has recently closed its side against General Motors after both Commission and Ford completed their testimony. GM began presentation of its case in Washington, July 7.

In Ford case next step is trial examiner's report to FTC, filing of final briefs by FTC and Ford, then final arguments, James M. Hammond is FTC attorney in charge.

Complaint alleges advertising 6 per cent charge on deferred payments by retail purchasers is misrepresentation because no provision is made for amortization.

F.O.B. PRICES case against General Motors and Ford. Hearings will begin after 6 per cent case is closed. Hammond will be FTC attorney in charge. Complaint allege advertising of misleading f.o.b. prices because they do not include all standard equipment, etc.

FAIR TRADE PRACTICE RULES proposed for retail automobile dealers. This code, introduced at public hearing during last NADA meeting in Detroit (see A. I., April 30, 1938) is still under study by FTC fair trade practice division headed by George McCorkle.

FARM IMPLEMENT industry inquiry reported to Congress July 6 with FTC concluding that evidence "indicates the existence of serious monopolistic conditions." Two-year investigation made in compliance with Bulwinkle resolution, approved by the President, June 24, 1936. Commission found that industry now consists of "long-line" companies as follows: International Har-

vester Co., Deere & Co., J. I. Case Co., Allis Chalmers Mfg. Co., Minneapolis-Moline Power Implement Co. and Massey-Harris Co., Inc. Report states that four to six of these companies "dominate both the manufacture and sale in the United States" of leading farm implements and equipment.

CENSUS OF BUSINESS

PROGRESS. Fifteen thousand usable returns have been received by Census of Business Headquarters, Philadelphia, in gigantic voluntary questionnaire-sampling of retailing and wholesaling during 1937 and first half of 1938. Automotive data collected will follow same schedules as 1935 census, which was made by personal canvass. All data will not be comparable with 1935 figures, but when possible will be correlated. F. A. Gosnell, chief statistician expects 250,000 returns by July 15 deadline; asks cooperation of all outlets to make results complete as possible.

STATE LEGISLATION

PENNSYLVANIA. Motor Vehicle Dealer's Commission Law (Act 461, 1937) Provides for licensing of dealers, salesmen and appraisers and reporting and enforcement of used-car trade-in prices. Hearings on removal temporary injunction restraining operating Commission set up by Act postponed until September, date of discretion of Dauphin County Court. Act expires automatically May 31, 1939.

A.M.A. June Estimate

Total factory sales of passenger cars and trucks in June are estimated by the Automobile Manufacturers Association at 184,400 units, bringing the six months' total to 1,301,033.

Latest available reports on domestic retail sales show that in the month of May 222,220 units were sold. This raised the nation's purchases of new vehicles for the first five months to 987,215 cars and trucks, compared to a retail total of 1,978,793 for the same period of 1937.

Dealers stocks of automobiles throughout the country were further reduced during May, retail sales for the period exceeding production for the domestic market by 54,046 units. This brought the net reduction in dealer inventories from the beginning of the year to a total of 121,284.

Retail sales in May included 187,306 passenger cars and 34,914 trucks.

Production

(Continued from page 37)

truck production, as compiled by the Automobile Manufacturers Association, place the industry's output for the month at 184,400 cars and trucks. This reflects the unexpected stability of production and sales, inasmuch as earlier estimates for June had anticipated a production between 150,000 and 160,000 units, and is a better indicator of the current position of the industry than a comparison with last year's output of 521,139 cars and trucks in June.—J. A. L.



Synthetic Rubber in Japan

To take advantage of the encouragement offered to plans for a "self-contained economy" or autarchy by the Japanese Government, some of the most important industrial interests in the country are giving serious study to the problem of producing rubber synthetically, and in some cases production on an industrial scale has actually begun.

Nippon Rubber Co., on the completion of its Yokohama plant next fall, will begin the production of synthetic rubber from acetylene by a process credited to Masasuke Mitunaga, head of the Umeno Research Institute of the South Manchuria Railway Co. Nippon Rubber, capitalized at 20,000,000 yen, is the largest firm in the field.

The Sumitomo Electric Wire Co. is building an experimental plant to produce 110 lb. per day of its synthetic resin Glycide, which is said to be a kind of thiokol. The process employed is related to that for the condensation of yperite, the poison gas. Glycide is said to be more expensive to produce than thiokol, but to have a greater tensile strength than duprene.

The Nippon Denki Kogyo K.K. (Japan Electric Engineering Co., Ltd.) is another firm that has entered this field. Its activity is watched with interest because of its close relation to the so-called "Mori Konzern," the electro-chemical trust. An experimental plant is now producing 22 lb. of synthetic rubber from carbide daily. The firm plans to enlarge its capacity to 220 lb. daily, 3 tons a month. One lb. of rubber is synthesized from 4 lb. of carbide.

The Nippon Gosei Kagaku K.K., Osaka, has pushed researches in two directions, namely, polymerization of chloroprene and polymerization of ethylene chloride. The company is planning to build plants to give a large-scale trial to both of these processes. Dr. Watanabe, of the Osaka Municipal Industrial Laboratory, is in charge of the researches.

The Showa Shuzo (Brewery) K.K., is planning to synthesize rubber from alcohol. Alcohol is converted into ethylene, which in turn

is converted into butadiene a diolefinic hydrocarbon which occurs in cracked petroleum. From this, synthetic rubber is obtained by the usual method.

The Furukawa Denki Kogyo K.K. (Furukawa Electric Industry, Ltd.), has been marketing for some time an insulating rubber made from polymerized olefine sulphide.

The Nippon Bicycle and Aircraft Tire Co. last year founded a research institute in connection with synthetic tire rubber, while the Nippon Tar Industry Co., of the Mitsubishi group, has acquired the patents held by the Osaka Municipal Industrial Laboratory. The Fujikura Electric Wire Co. is considering the production of synthetic rubber to attain self-sufficiency in insulating materials.—*Kagaku Kogyo Jiho*, Tokyo (Chemical Engineering News).

Torque Indicators for Aircraft Engines

It is very desirable to have means for accurately determining the torque of an aircraft engine. On a test stand it is difficult to obtain accurate results with a fan dynamometer or club, whether a pivotally-mounted stand or a calibrated club is used, as the interaction between the club and the stand is too great to be taken care of by an advance calibration. It is also impossible at the present time to make accurate measurements of the power developed in flight. A knowledge of the manifold pressure and of the speed of rotation, even when correction formula are applied, can only lead to results which leave much to be desired from the standpoint of precision.

A number of torque indicators have been developed. In France, the device invented by M. Poincare, by which the tangential effort on that member of the planetary reduction gear which is held from rotation is determined, has been built and developed to a practical form by the Farman concern. Bench tests have shown that the results are accurate to within 2 per cent, which is quite

(Please turn to next page)

satisfactory. Flight tests have also been made of this device on a Potez 25 with Farman engine and on a Potez 541 with the Gnome & Rhone 14K engine.

Mention should be made here of the A.C.O.M.E., which is particularly ingenious. This torque indicator, which is now under development, is based on the change of the magnetic permeability of a steel shaft when subjected to stress.

On the other hand, several investigations are under way with the object of developing a torque indicator based on measurement of the torsion in the drive shaft. This method offers promise for use in installations where the propeller is driven through a flexible shaft.

Outside of France the best-known torque indicator is that of the D.L.V. (German Research Institute for Aviation). The problem is not always that of a torque indicator installed on the engine, as the instrument may also take the form of a dynamometer hub which can be used as a propeller hub. In the United States a torque indicator similar in principle to that of M. Poincare has been tested on a Pratt & Whitney engine, and details of the instrument and of the tests were given in the *S.A.E. Journal* for Feb., 1938.

The problem of measuring the torque of aircraft engines, therefore, can now be regarded as solved. The accuracy is satisfactory and the weight is quite tolerable, the heaviest instruments adding only about 20 lb. to the weight of the engines. The instruments, moreover, are quite reliable in operation.—*La Technique Moderne* for June 15.

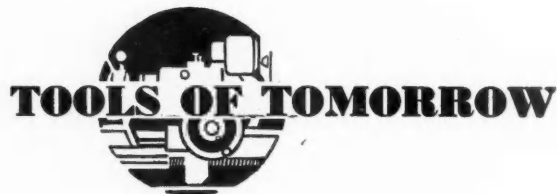
Harry H. Wetzel

Harry H. Wetzel, vice-president and general manager of the Douglas Aircraft Corp., died Tuesday, July 5, after an emergency abdominal operation. His death followed by only a few weeks the first test flight of the DC-4, America's largest commercial land plane, construction of which he oversaw from its conception.

Smith Corp. Renews Contracts

A. O. Smith Corp., Milwaukee, has renewed contracts with its American Federation of Labor unions after negotiations lasting less than a day, it is announced. The only change in the contracts is the insertion of a clause which provides that men laid off before they had received their second wage increase specified in the agreement would be given such increase when they return to work.

July 9, 1938



Seaman Body Corp., Milwaukee, division of Nash-Kelvinator Corp., Detroit, manufacturer of closed bodies for Nash and La-Fayette cars, has completed installation of one of the largest presses in American industry. It was built by the General Machinery Corp., Hamilton, Ohio, and is capable of producing a one-piece sheet steel automobile top, including top of cowl, windshield opening and rear window in one stamping, or from the dash line to the trunk opening, which requires a sheet of steel 72 x 148 in. The die space measures 100 x 180 in., and the dies weigh from 60 to 70 tons. They are entirely handled by overhead crane. The total weight of the press is more than a million pounds, and its working pressure at the bottom of the stroke is 950 tons on the inner bankholder, 550 tons on the outer bankholder, and 750 tons on the lower plunger. All functions of the press are automatically controlled by electrical apparatus, which is interlocked to provide safety for operators. To install the unit it was necessary to lay a reinforced concrete foundation completely encased in 1/2-in. special steel interlocked panels, driven down 24 ft.

Coolants

... Self-contained tank and pump units offered in new series by Pioneer.

A new series of self-contained coolant tank and pump units was brought out recently by the Pioneer Engineering & Mfg. Co., Detroit. These units are designed to serve as complete individual or standby units for supplying coolant for one or more machines. They are said to be especially adaptable to machines not originally equipped for coolant. Five different sizes are available, each having optional pumping characteristics.

The tanks are of welded steel throughout and are fitted with a cast-iron cover. Models 8H and 15H are designed to have a Pioneer model H Pump mounted in a compartment below the tank bottom. Models 26V, 35V, and 50V are designed to have a Pioneer model V pump mounted on the stationary part of the tank cover and the pump immersed in the coolant.

Pumps available with these units provide capacities from 1 to 80 gal. per min., and pressures up to 23 lb.

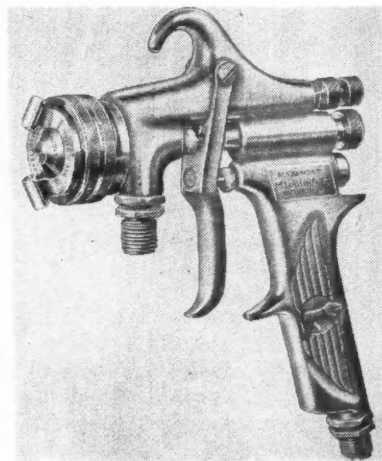
Spray Finishing

... Alexander Milburn Co. introduces new gun for use with various fluids.

For spray finishing with various fluids, the Alexander Milburn Co., Baltimore, Md., has announced its new model OM spray gun.

The nozzle is supplied in two styles, standard siphon or pressure feed and mushroom type pressure feed. The standard siphon feed nozzle has a smaller diameter surrounding the orifice, but will operate on either siphon or pressure feed. The mushroom type pressure feed nozzle has a larger diameter and is tapered. It is especially designed for large production work, long life, and fluids difficult to spray.

The cap is made of stainless steel. It closely fits a ground surface on the fluid nozzle and is claimed to eliminate the eccentricity and variability of the conventional atomizer heads. The atomizer head revolves around the fluid nozzle cap for vertical or horizontal spraying without disturbing the accuracy of the center air.



Milburn model "OM" spray gun

Automotive Industries

The OM spray gun is equipped with a replaceable thread baffle ring assembly. This assembly is held to true concentricity on the spray gun body by a ground shoulder on the fluid nozzle. Replacement of the entire gun body or spray head when threads have become worn is eliminated.

Vascoloy-Ramet Signs More Dealers

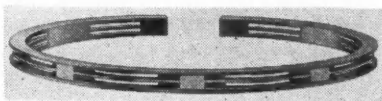
Vascoloy-Ramet Corp., North Chicago, Ill., advises that the following companies have signed dealer contracts: Armstrong Brothers Tool Co., Chicago; Apex Tool & Cutter Co., Shelton, Conn.; Pratt & Whitney Co., Hartford, Conn.; Davis Boring Tool division of Larkin Packer Co., St. Louis, Mo.; Wendt-Sonis Drill Works, Hannibal, Mo.; Cole Carbide Industries, Detroit, and Genessee Tool Co., Inc., Fenton, Mich.

Tractor Franchises

Graham-Bradley tractor franchises have recently been signed by four of the leading farm-implement dealers in the four western provinces of Canada, it is announced by E. J. Harrington, tractor sales manager at the Graham-Paige Motors Corp.

New Oil Control Ring By Sealed Power

A new type oil control piston ring, called the Hi-F, has been developed by Sealed Power Corp., Muskegon, Mich. Three distinguishing features of this ring are pointed out by the manufacturer as follows: 1. The section of the ring directly opposite the gap ends is supported by a bridge which gives additional strength at the back of the ring; 2. The wide channel groove is machined eccentric to the peripheral surface, being shallowest at the back of the ring and gradually increasing in depth in the direction of the gap ends; 3. The wide channel groove is indexed in such manner that it runs out at two points near the back of the ring, further strengthening the



ring near the area of greatest stress.

Claims of the manufacturer for the Hi-F include: greater possible range of tension and unit pressures to meet every operating condition; increased strength—more freedom from breakage; more uniformity of outward radial pressure around the peripheral circumference; increased

ventilation for the return of oil scraped from the cylinder wall; original efficiency maintained over longer periods of operation.

The Hi-F oil ring is available in single or double slot models. The double slot models are made in 1/4-in.-wide sizes only and have all the features of the Hi-F made in the single slot models plus additional area of ventilation.

Calendar of Coming Events

CONVENTIONS AND MEETINGS

National Petroleum Association Meeting, Atlantic City, N. J. Sept. 14-16
Seventh International Management Congress, Washington Sept. 19-23
SAE National Regional Fuel and Lubricants Meeting, Tulsa, Okla. Oct. 6-7
SAE National Aircraft Production Meeting, Los Angeles, Calif. Oct. 13-15
American Welding Society Meeting, Detroit Oct. 17-21
SAE Annual Dinner, New York Nov. 14
SAE National Transportation Engineering Meeting, Commodore Hotel, New York Nov. 14-16
National Safety Council Meeting, Chicago Nov. 14-18
American Petroleum Institute Meeting, Chicago Nov. 14-18
National Industrial Traffic League Meeting, New York Nov. 17-18
Automotive Service Industries Show, Chicago Dec. 5-10
*National Standard Parts Association Meeting, Chicago Dec. 2-3
SAE Annual Meeting, Detroit Jan. 9-13

SHOWS

New York, National Motor Truck Show, Nov. 11-17
New York, National Automobile Show, Nov. 11-18
Pittsburgh, Pa., Automobile Show, Nov. 11-18
Detroit, Mich., Automobile Show, Nov. 11-19
Columbus, Ohio, Automobile Show, Nov. 12-18
Buffalo, N. Y., Automobile Show, Nov. 12-19
Chicago, Ill., Automobile Show, Nov. 12-19
Milwaukee, Wis., Automobile Show, Nov. 12-19
Minneapolis, Minn., Automobile Show, Nov. 12-19
*Philadelphia, Pa., Automobile Show, Nov. 12-19
*San Francisco, Calif., Automobile Show, Nov. 12-19
Boston, Mass., Automobile Show, Nov. 12-20
Los Angeles, Calif., Automobile Show, Nov. 12-20
*St. Louis, Mo., Automobile Show, Nov. 12-20
*Elmira, N. Y., Automobile Show, Nov. 14-19
New Haven, Conn., Automobile Show, Nov. 14-19
Indianapolis, Ind., Automobile Show, Nov. 19-25
Baltimore, Md., Automobile Show, Nov. 19-26
Rochester, N. Y., Automobile Show, Nov. 19-26
Montreal, Canada, Automobile Show, Nov. 19-26
*Washington, D. C., Automobile Show, Nov. 19-26
*Cincinnati, Ohio, Automobile Show, Nov. 20-26
Newark, N. J., Automobile Show, Nov. 26-Dec. 3
Denver, Colo., Automobile Show, Dec. 5-10

*Tentative

Books

of automotive interest

Auto-Dictionary, by Benno R. Dierfeld. Second Edition. Published by Albert Nauck & Co., Berlin.

This is a three-language dictionary of automobile terms which is published in three volumes. The first volume, here under review, has the German expressions arranged alphabetically in the left-hand column and French and English equivalents in parallel columns. In the other two volumes the French and English terms will be arranged alphabetically. In the new edition a considerable number of relatively new terms have been added, most of them having to do with such recent developments as front drive, independent suspension, Diesel engines and their equipment, new accessories and parts, and new equipment for service stations and garages. The standards committee of the German automobile industry sometime ago adopted a standard nomenclature of automobile parts, and terms included in this vocabulary are indicated in the dictionary by the use of close-set type. As many automobile terms in use in England differ from the corresponding terms employed in this country, it could hardly be expected that the expressions given in the English column should be in complete accord with American usage, but it can be said that on the whole the English equivalents seem to be well chosen. The price of the volume is 8 marks.

We have received a copy of an anniversary publication issued by the Transport Co. of the City of Budapest on the occasion of the tenth anniversary of its organization, entitled *A BSZKRT Tíz Éve 1923-1933*. While the municipal street-car lines were taken over by the BSZKRT in 1923, a separate municipal motor bus service was taken over by the organization only in 1932. For this bus service a garage with a floor space of 77,000 sq. ft., without obstructing posts or columns, was completed in 1929. The BSZKRT replaced the gasoline engines of the motor buses which it took over from the city with Diesel engines of Hungarian manufacture, and in that way achieved a considerable saving in operating costs. The report is in Hungarian, but is accompanied by an abstract in German.

AT the present stage of our national economy the consumer's dollar is inadequate to create a market for anywhere near 4,000,000 passenger cars annually without sharp repercussion. This repercussion is being felt as a used car problem of serious proportions, in repossessions and over-trading which is exhausting the capital of dealers, and in a near-pauperization of the marginal consumer.

An approximate 20 per cent is too high a proportion of the national income to be spent for individual transportation, given the purchasing power of today. And it cannot be gainsaid by pointing to previous high output years with the comment that it worked well then. Times have changed. A quickened cycle of feast and famine years is upon us, not as a passing phase, but as a chronic condition, and the crux of the situation is instalment selling as now practiced. Certainly, there will be another big year, but it will be followed by two or three years of scant output.

Our ideas of what is fit and proper, and upon which we are prone to base our estimate of the worth and soundness of instalment selling, go back to the time when this method of financing distribution was confined almost exclusively to automobiles. Whatever else was sold on credit was so limited in dollar volume as to have little effect on our economy. Credit selling helped the automobile industry grow to first rank, but it can no longer be relied upon to keep it there. The changes which have come about in the extent and practice of instalment business have altered the picture drastically.

Three developments can be listed as most important. These are:

Increase in the variety and volume of goods sold on the instalment plan.

Expansion in number of credit sources and in the amount of funds available for credit.

Willingness of the consumer to incur onerous contractual obligations.

The variety of goods sold on the instalment plan now covers a substantial number of all consumer wants. Washing machines, refrigerators, vacuum cleaners, furniture, household furnishings, radios and

pianos, represent items requiring large outlay. Then there are countless smaller items such as clothing and tires. Each and every one of these makes a call on the consumer's dollar and with increasing pressure because the volume has grown steadily.

The sources of credit are no longer confined to a few large finance houses. There are now in the neighborhood of 1500 finance companies and competing with these smaller institutions are countless banks which have entered the field with little fanfare. All these agencies are in competition to put their funds to work and so apply additional pressure upon the consumer.

Couple the consumer's readiness to incur instalment debt with the plentitude of credit and the pressure to

which followed. Operating data of retail stores show that the consumer by and large became oversold by the middle of the year and from that time on was to heavily obligated to continue purchasing, especially in the face of rising prices.

The fact that instalment selling permitting packing future business into the first six months of the year is not necessarily reason for damning the practice. What might have been a gentle fall became a general rout because the artificiality of the situation was unrecognized. Manufacturers, retailers, and consumers believed that we were moving steadily forward to reach a per-

Car Sales Weakened

have it used, and a situation arises quite unlike anything hitherto experienced in the business world. It permits the prompt locking up of purchasing power and potential earnings in contractual obligations when business shows evidence of moving ahead, and by the same token, exhausts purchasing power quickly to bring about and aggravate a recession. The net effect is an unbalancing of the economic machine. The period of recovery is short-lived; the ensuing period of recession deep and more enduring. Manufacturing and retailing operations suffer from instability and the consumer is swung from illusions of prosperity to bankruptcy fancied or real. Look back over 1937 if you would see how all this works out in practice.

Credit selling was one of the principal factors in creating the prosperity of the first six months of 1937. It was also largely instrumental in bringing on the recession

manently higher plateau and based their operations accordingly. Manufacturers and retailers built up inventories against this unrealizable boom, while the consumer was induced to obligate himself to a standard of living which he could not support, even with continuity of employment.

Repossession statistics are cited to prove that there was no overloading of the consumer. The house furnishings business, for instance, has a current repossession record of 5 per cent; the automobile financiers quote 4.1 per cent for new cars and 13.2 per cent for used cars in 1937. This is thought to be small and inconsequential. In the case of house furnishings it is small—in dollar volume, but the percentages represent a heavy dollar volume for automobiles and dollar volume is what counts. This single item, representing the largest single outlay of individual consumer capital brought the downfall of too many people.

Instalment selling needs to be re-examined in the light of recent developments. We should dismiss the

idea that it is sound just because it stimulated industry in the past and try to discover just how sound it really is. There is need to determine closely what the consumer is capable of spending, to the end that he remain solvent and the industrial machinery of the country operate with some degree of balance. In particular, the automobile industry needs to ponder these things because its welfare is now so inextricably tied to instalment selling, and because, in

usually excluded from compilations because thought to make loans for other than consumables. However, one of the largest cash department stores in the country finances its furniture sales wholly through a personal loan agency, and there are instances unnumbered where the consumer, financially embarrassed by

the need to make payments on time-bought purchases, borrows from such organizations to meet bills. Can these agencies be overlooked when they advertise in the daily

by Too Many Hypodermics?



This Article

By Arthur Fertig

presents conclusions on the present consumer-market position of the automobile by a man who has specialized as a retail consultant to many other industries for more than 20 years.

All consumables have been affected in recent years by the tremendous extension of retail credit in the form of instalment selling. Consumer resources do not flow from a depthless well, so that the extension of consumer credit in other lines of merchandise has affected the sale of automobiles more than the industry sometimes remembers.

In other words, as of 1937-38, the prospective automobile purchaser has available for use not the amount that would be inferred by census studies of income groups, but what is left after he has piled up a succession of instalment contracts of varying maturity.

The whole state of consumer credit selling is, therefore, of profound importance to the automobile industry.

Few people are better qualified than the author to comment on the state of consumer credit, and how it affects consumer ability to buy. His facts have been checked with a number of outside sources and are believed to be reliable. His conclusions, as they relate to the automobile industry, are those of an informed outsider, and have particular interest from that standpoint.

For those of our readers who commend, differ with, wish to extend or otherwise comment on Mr. Fertig's thesis—the columns of **AUTOMOTIVE INDUSTRIES** are open.

turn, our national welfare depends so heavily upon the continued sound operation of the industry.

Endless arguments have been trotted out to prove that instalment selling was not as great in 1937 as it was in 1929. Even if this were true, of what moment is it? There is no proof that conditions were sound in 1929. Many have stated that credit selling is not detrimental, but they consider only the benefit it has brought to specific industries and ignore the national economy. It is said that the practice has proved of incalculable benefit in the distribution of commodities and that it has acted to budget family incomes, but it is left unsaid what the long term effect has been on the consumer.

These arguments prove absolutely nothing. They merely cloud the issue to make fact finding difficult. No one knows the full extent of instalment sales, nor are there agencies making compilations which work with adequate scope. The compilations which show that the volume of credit sales have been lower last year than in 1929 are noteworthy for their omissions. Finance house statistics are not all-embracing.

To begin with, there are the personal loan organizations. These are

press that they will loan for credit purchases?

And while we are seeking the hidden sources of credit financing, let us not overlook the banks. These institutions held back for many years to give rise to the strictly finance house, but they could not indefinitely resist this lucrative business. Today they are in it far deeper than generally realized. They report to no central agency and their volume of business remains secret. Then there are finally, the credit unions, organized to assist the marginal consumer, which make small loans which may or may not be employed to purchase on credit.

The person who would attempt an honest calculation of time sale volume can be led astray easily. For example, questioning a retailer as to the percentage of volume of his instalment business reveals one figure; questioning a finance house begets another. And the reason is: Finance houses do not monopolize the credit business. Retailers are wont to report as cash sales those for which they get cash by selling the instalment notes to finance companies. Still another leak in data source arises from the practice many retailers employ of carrying a certain percentage of their own notes.

Automobiles Have New Competitors

Few people would consider examining the so-called open charge transaction for instalment selling data, yet such cannot be overlooked if one aims to reach a realistic conclusion. When such charge accounts run past the 60 to 90-day period unpaid, they become in effect instalment sales. The affect on the consumer and retailer is similar and the debt backs up to involve the manufacturer.

Thus the amount of money employed to lubricate the flow of commodities into public hands is much higher than generally supposed. Existing data fails to prove it in dollars and cents, but studies of actual retailing operations make it quite apparent. In 1937, approximately 75 per cent of all house furnishings were sold on credit, although available finance company reporting would show a lower figure. Such items as refrigerators, radios and washing machines run closer to 85 per cent and the sum total dollar volume runs far ahead of published estimates.

Now there is no particular point in striving to make the figure of instalment debt as high as possible, but when we attempt to get a true picture of what is taking place we

get a high figure. The fact that more types of commodities are sold by this method and in much greater volume, simply means that the automobile industry is fighting a new competition. And we may say further, that to the extent that it is successful in the fight by so much may it encounter later excoriation. The automobile producer sells the most costly item by this method and has more power than any other industrial group to break the consumer's back. Last year he was successful. He sold too many cars to the marginal buyer and so put an excessive strain on individual capital.

There is no possibility of fixing sole blame for conditions arising out of instalment selling, nor is it desirable to do so. The question is, what's to be done about it? What, in particular, is the automobile manufacturer going to do, since he is most heavily involved?

Capital the Crux, Not Terms

Criticism has been levelled at the automobile industry and thus far the only reaction noticeable relates to financing terms. Terms are to be made more severe. But will this have any worthwhile results if the pressure to sell is maintained at a constant? If the consumer's capital outlay is already too high for his economic well-being, shortening the period of time within which full payment must be made will only increase the burden.

The important thing is what you do to the consumer's capital burden, not what you do to terms. This seems to have been entirely overlooked. Instalment selling cannot be made "sound" at the expense of public bankruptcy. Soundness involves more than a reduction in repossession; it must embrace long time public solvency. The fact that the finger of scorn is pointed at the piano industry because it sells on very long terms is proof of a widespread misconception. A piano is a long-term investment, it stays put in the home without serious style depreciation, and the capital outlay required at any given moment is relatively small. Purchase of this commodity does not put the low-income earner out of the market for other commodities. If, on the other hand, the piano were traded-in annually, or even every two years, the periodic call on capital would be heavy and there would be cause for alarm.

In the early "twenties" there was a great deal of talk about a saturation point in automobile sales, but the industry's ability to swell volume

still more, silenced that idea effectually. There was also comment that the automobile was absorbing too large a share of the consumer's dollar, but this, too, passed out of use as business became more and more dependent upon the sustained operation of the industry for general welfare. But both these questions can be raised again today with more validity. Isn't it conceivable that the industry has attained middle age? And if so, that it is now trying to keep its youthful figure at the sacrifice of national health? The outsider believes that there is much substantiating evidence, not the least of which is the fact that financing pressure and volume sales have led to a vast amount of unused transportation—spoken of as the used car problem.

By no stretch of the imagination is an annual sale of 4,000,000 cars, or anywhere near that figure, a healthy sign. The national income is down and there is very little upon which to base an optimistic view of purchasing power recovery. Employment promises to be very spotty as far ahead as one can see, and a large body of permanently unemployed will be with us for some time to come. Working hours will be shorter and workers will earn less. Likewise, taxes must remain high. Nor will conditions take on a permanently rosier hue if such purchasing power as is pumped out by the Government becomes promptly locked up in excessive contractual obligations. A continuation, therefore, of the present attitude toward automobile sales and instalment practice can be a blight on the country rather than a blessing to it.

Capital Outlay Rising

Regardless of the striking technical advances by which more quality per dollar is given the buyer, the unit price has been rising steadily and today, in the face of a lower national income, the buyer of a low-priced car must purchase a high-priced product. Furthermore, the emphasis laid upon perpetual trading, pushes the capital outlay even higher. When maintenance charges, insurance and taxes, are added to initial cost, a condition arises where a large element of the public is riding a standard of living which it cannot afford. Even subsidization of the motorist via the channel of dealer bankruptcy, which has been going on for years, cannot be maintained indefinitely.

If the industry undertakes to
(Turn to page 64, please)

Just Among Ourselves

The Industry's Nightmares

WE have hinted before at the ideas developed in an article by Arthur Fertig, which begins on page 48 of this issue. Publication of the article coincides roughly with a wave of pleasant and enthusiastic optimism which seems to be breaking over the industry from all sides. There are a good many sound reasons for feeling better about the latter part of this year, but the conditions to which Mr. Fertig refers, and which we have mentioned from time to time in these pages will continue to operate relentlessly so far as the long-term view is concerned.

In talking to the sons of Chevrolet dealers who graduated recently from a course in merchandising sponsored by the company, Alfred P. Sloan, Jr., chairman of the General Motors, said he saw no reason why the automobile business should not continue to be a good one in which to be engaged.

Mr. Sloan's view is the culmination of 10 years or more of close personal interest in the problems of distribution which have lately become acute in the industry, and are worthy of respect not only because of their sober soundness, but because of his early recognition of the problem.

But before the industry reaches a truly stabilized basis, there must be "liquidated" in one way or another quite a few besetting nightmares. Most fundamental of these problems, as Mr. Fertig points out, is consumer inability to buy, under certain price conditions, cars priced at the present minimum level.

There are some indications that the industry is alive to this phase of the problem and that it will be met with "transportation" cars, priced below the "style merchandise" level of the cars offered during the last five years. This is not a panacea, is not looked upon as a complete solution to the problem of maintaining volume, but is rather a logical extension of product to meet a market.

At lower price levels there will remain the problem of financing tailored to fit. Mr. Fertig believes that automobile factories will have to assume the financing burden, because it will become less profitable to the finance companies, and many of them will turn away from automobile financing to more profitable fields.

We believe there will undoubtedly be a tendency in this direction, but doubt that financing of the future will be conducted along the present lines. More likely, we believe, is the possibility that the automobile dealer will become, literally, an individual-transportation merchant who sells—or rents—a definite transportation service to the individual consumer.

There are many phases to the problem of the future of the automobile industry. Some of them are being worked out through the intricate channels of public administration (there are so many of these that we have felt it necessary to begin a new department in the news section to cover them). Others are the reflection on the part of the public of a new attitude toward automobiles. For a good many years the public took what it got and liked it. Now the public is more articulate on the question of what it likes and dislikes in cars, and a good many people feel that we have had to wait too long for some obvious improvements in design.

During ensuing months, discussions of various aspects of the problem will appear in these columns. Early appearance of articles by Ray B. Prescott, Norman G. Shidle, and Thomas G. MacGowan will illuminate different points. But the future of the industry is a problem which concerns all of us and we want your views too.

Safety Must Be Driven Home

AN appalling total of highway and fireworks accidents over the Fourth of July weekend brought the disillusioned comment from several safety experts that you can't legislate safety. Norman Damon, director of the Automotive Safety Foundation, told us recently that those states and communities which have experienced the most favorable reduction in highway accidents have been those, generally speaking, which engaged in a systematic and vigorous educational campaign, rather than those which depended on drastic legislation and enforcement.

Since the beginning of drastic enforcement of a 50 m.p.h. speed law, Pennsylvania has suspended for 90 days, operators' licenses of more than 3000 drivers. Now the enforcement authorities are beginning to talk about driver-training schools. The educational route is slower and less spectacular than the enforcement route, but its results are probably sounder and more enduring.

—HERBERT HOSKING

Leaf Springs

2

Part 1 appeared in the June 25, 1938 issue of
AUTOMOTIVE INDUSTRIES

By K. K. PROBST and
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IN the preceding article on research on leaf springs carried out by the Leaf Spring Institute, Mr. Shoemaker gave a broad outline of the work. In this article some of the engineering data obtained are discussed in detail. To start with, we will consider some of the important features of the dynamic tests mentioned in the previous article.

Fig. 1 shows simultaneous movements of the passenger, the car body, and the axle, giving amplitudes, accelerations, and oscillating periods.

* Presented before the Detroit Section, Society of Automotive Engineers, May 23, 1938.

On curve C, of axle movement, it will be noted that after the axle had already started downward, a reversal of motion took place, probably as a result of shock-absorber action. Inasmuch as the velocity was high (about 5 ft. per sec.), and the unsprung mass of considerable magnitude (about 350 lb.), the reaction from this reversal was transmitted through to the car body and its passenger.

Fig. 2 shows the effect on the driver, of a bump striking both rear tires, with and without rear-seat passengers. It will be seen that curves A, taken with driver load only, have more than 100 per cent greater amplitude and 500 per cent greater acceleration than curves B, taken with a fully-loaded car.

These two figures, therefore, furnish definite evidence that: (1) Shocks may be transmitted to pas-

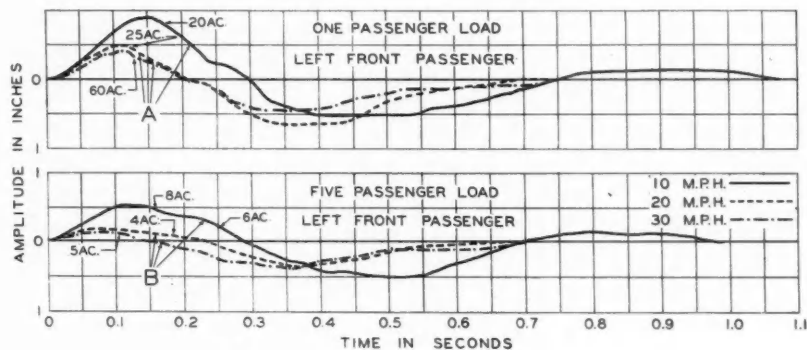


Fig. 2—Effect of load on vertical movements of driver at three speeds

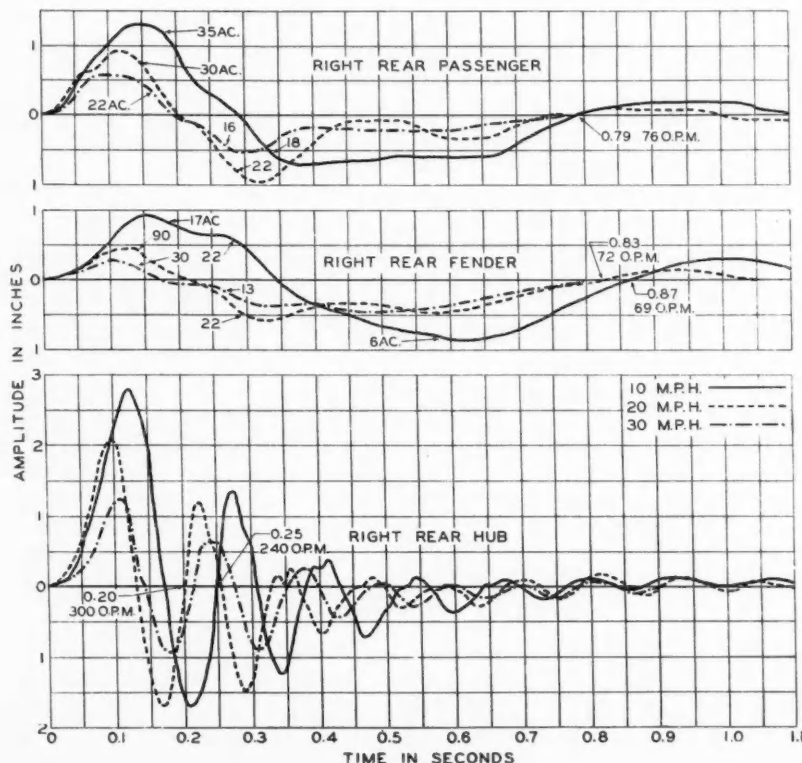
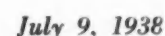


Fig. 1—Vertical motion of passenger (top), car body (center), and rear axle (bottom) plotted against time

sengers from other than road causes, and (2) that the amplitudes and accelerations are noticeably greater when the static deflection of the springs is less. Both these deductions are entirely logical, but here we found numerical data which gave us the basis for further work. We have about 1000 curves in all, and the possibilities for further study can be easily realized.

Fig. 3 is a rate curve of the rear spring on a 2900-lb. car. Curve A shows the rate of the spring, shackle, and tire. Curve B shows the rate of

From this table, our laboratory



ing and general stability are largely governed by the rate per inch stiffness of the spring on the car.

4. That in the cars tested, pitching could be reduced if the O.P.M. were made nearly equal at front and rear.

5. That when driving without a rear-passenger load, the comfort of the driver was adversely affected if the O.P.M. of the rear springs were increased.

It appeared to our engineering committee, therefore, that the first approach to a better ride, lay in designing a spring which would accommodate itself to the load. Inasmuch as softer conventional springs caused more roll and instability, it was decided to investigate the possibilities of variable-rate springs.

While "overload" or "helper" springs have been widely used in the commercial field, and lately on passenger cars equipped for trailers, the

conventional layout, consisting of two separate springs, is too heavy and expensive for production passenger cars. It was then suggested that by building one spring in two or more units, with heavier leaf grading and less deflection in each succeeding unit, it might be possible to maintain approximately the same stress and weight as in present practice.

Fig. 5 shows a variable-rate rear spring of three units, designed for a 3500-lb. car. This spring carries a normal load of 1000 lb., has 12 in. static deflection, and weighs about the same as a conventional spring. The first unit has four 0.214 in. leaves; the second, three 0.237-in. leaves, and the third, two 0.291-in. leaves.

From the design chart, Fig. 6, it will be seen that with 4 in. deflection past full load, the eye has 16 in.

total movement. The second unit is set for a maximum deflection of 12 in. (if measured at a length equal to the main leaf), and the third unit is set for 5 in. deflection, measured in the same manner. The first and second units contact at 8 in. above the normal-load position and do not separate on the car, because the shock absorber limits the travel.

The third unit contacts at the two-passenger-load position, and at curb weight has an opening of about $\frac{1}{8}$ in.

The maximum stress in the leaves is reduced in the second and in the third unit to compensate for the increased stress range. By "stress range" we mean the difference between the maximum and minimum stress through an average assumed amplitude.

While the variable-rate spring may be built with any desired number of

Table I—Data from Rate Curves

	1	2	3	4	5	6	7	8	8A	8B	9	10	11	12	13		14	15	16														
															Car No.	Size or Type				No. of Leaves	5-Passenger Sprung Load	Designed Rate of Spring	Actual Rate on Car	Percentage of Car Rate Over Designed Rate	Static Def. at Actual Rate on Car 1-Passenger Load	O.P.M. Estimated from Actual Rate on Car 1-Pass. Load	O.P.M. as Tested by Stop Watch 1-Pass. Load Shocks Off	Static Def. at Designed Rate 5-Passenger Load	Static Def. at Actual Rate on Car 5-Passenger Load	O.P.M. Estimated from Designed Rate 5-Passenger Load	O.P.M. Estimated from Actual Rate 5-Passenger Load	O.P.M. as Tested by Stop Watch 5-Pass. Load	
																																Shocks	
																																Off	On
FRONTS	1	Coil		857	92	92	0%	8.7	64	68**	9.3	9.3	62	62	?	77																	
	2	37x1¾	10	750	119	135	13%	5.3	81	88**	6.3	5.6	75	79	?	86	18.2	41.2	3.0														
	3	Coil		871	78	86	10%	9.7	60	70**	11.2	10.2	56	59	?	68																	
	4	Coil		880	98	103	5%	8.1	66	66**	9.0	8.5	63	65	?	63																	
	5	Coil		985	98	93	-5%	10.4	58	59**	10.0	10.7	60	58	?	60																	
	6	48x2½	14	883	108	157	45%	5.3	82	86**	8.2	5.6	65	80	?	84	27.7	31.8	4.0														
	7	40.4x2	11	757	130	179	38%	4.0	94	96	5.8	4.2	78	91	94	96	16.5	46.0	5.0 3.5														
	8	Coil		845	92	90	2%	8.75	64	67**	9.2	9.4	62	61	?	67																	
	9	37x1¾	10	760	118	159	35%	4.5	88	100	6.5	4.8	74	86	96	108	18.2	42.0	3.0														
	10	43x1¾	14	880	120	165	38%	5.0	84	92	7.4	5.35	69	81	95	99	29.0	30.5	3.5														
REARS	1	54.1x2	7	1005	126	132	*5%	5.9	78	83	7.9	7.6	67	68	70	79	35.5	28.3	5.0														
	2	53.6x1¾	9	911	108	126	16%	5.7	79	90**	8.5	7.2	65	71	75	82	31.7	28.8	4.2														
	3	54x2	9	1031	113	155	37%	5.1	83	84	9.1	6.7	62	73	73	73	33.0		4.7														
	4	Coil		1033	141	144	2%	5.6	79	78	7.3	7.2	70	71	68	68																	
	5	54½x2	9	1122	112	127	13%	7.0	71	71	10.0	8.9	59	63	68	68	32.1	35.0	5.5														
	6	54x1¾	10	1001	125	162	30%	4.8	86	86	8.0	6.2	66	76	78	79	35.0	28.6	3.0														
	7	48¾x2¼	11	888	90	185	105%	3.5	100	99	8.3	4.7	65	87	85	86	20.3	42.6	4.0 6.0														
	8	54.5x2	7	990	120	124	35%	6.05	76	77	8.3	8.0	65	66	74	74	34.4	28.8	5.0														
	9	53.6x1¾	9	875	108	123	14%	5.1	83	90	8.1	7.1	66	71	78	90	31.7	27.6	4.2														
	10	54x1¾	10	1020	110	113	3%	6.75	72	83	9.3	8.4	62	65	79	85	37.0	27.5	4.1														

* 17% by actual spring test.

** Shocks On

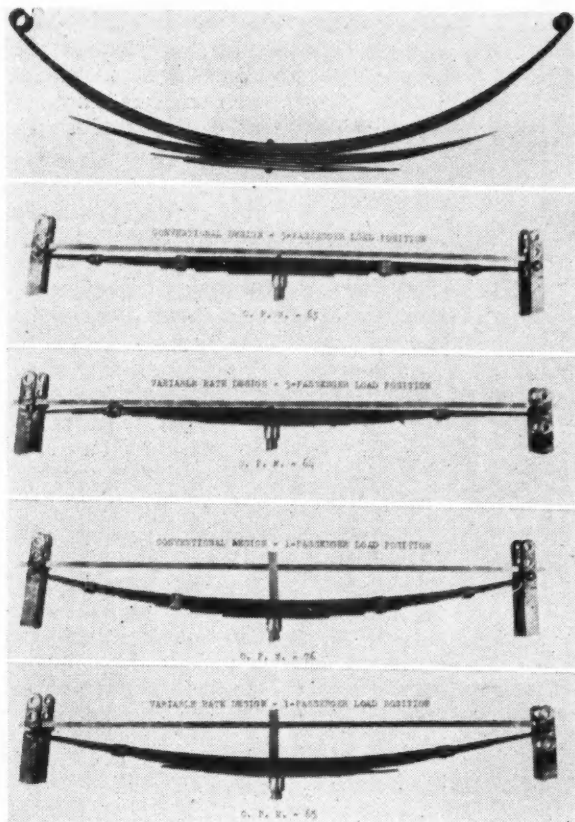


Fig. 5—Variable-rate, three-unit rear spring for 3500-lb. car

Conventional spring 5 pass.
load O.P.M. = 63

Variable rate spring 5 pass.
load O.P.M. = 64

Conventional spring 1 pass, load
O.P.M. = 76

Variable rate spring 1 pass.
load O.P.M. = 65

throughout the length of the leaf at any load, if a true arc is secured under that load. Due to the grading of variable-rate springs, there is always a slight but unobjectionable variation in stress distribution at normal load.

We found that with proper grading, spacing, tapering, and minimum "nip" (Fig. 7) we could obtain substantially equal stress throughout the entire spring at maximum loading, the variation in the spring curve from a true arc coming within plus or minus 1/16 in. R designates a true radius.

The frequency of a variable-rate spring depends on the static deflection d , the per cent of increase of the rate to the increase in load, and on the amplitude of oscillation. When the increase in rate is less than the increase in load, variable-rate springs do not deviate greatly from the law of straight-line springs. That is

$$\text{O.P.M.} = \frac{188}{\sqrt{d}}$$

Our O.P.M. tests show from 2 per cent to 8 per cent increase in number of oscillations under this con-

units, each design having its own characteristics, our experimental work was done with two-unit and three-unit designs.

The three-unit design seemed to have a little better stress distribution and was slightly lighter. The two-unit design, however, was a better production job, and for this reason might be more practical.

Three questions arose in connection with these designs:

1. Whether in the three-unit design, tying together the first two units, either by spring rebound clips or with spring covers, would change the frequency. Tests showed that external interference with the spring, outside of its range of oscillations on the car, had no effect on the frequency.

2. Whether dirt would remain between the units. Many miles of testing of variable-rate springs without covers showed no detrimental amount of dirt, snow or gravel remaining between the leaves, when the third unit made contact at not more than a 2-passenger load. When the opening is more than 1/8 in. at curb-weight position, some form of dirt protection may be advisable.

3. Whether equal stress distribution could be obtained. If the main leaf is formed to a true radius, there will be equal stress distribution

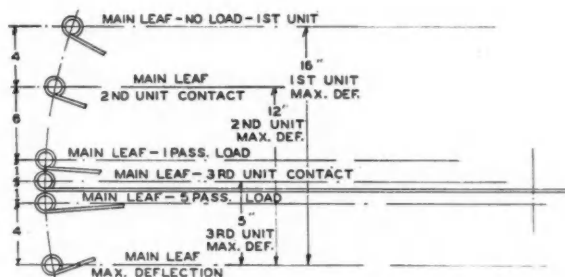


Fig. 6 — Design chart of three-unit, variable-rate spring

Fig. 7—Determining data for spring-rate curve



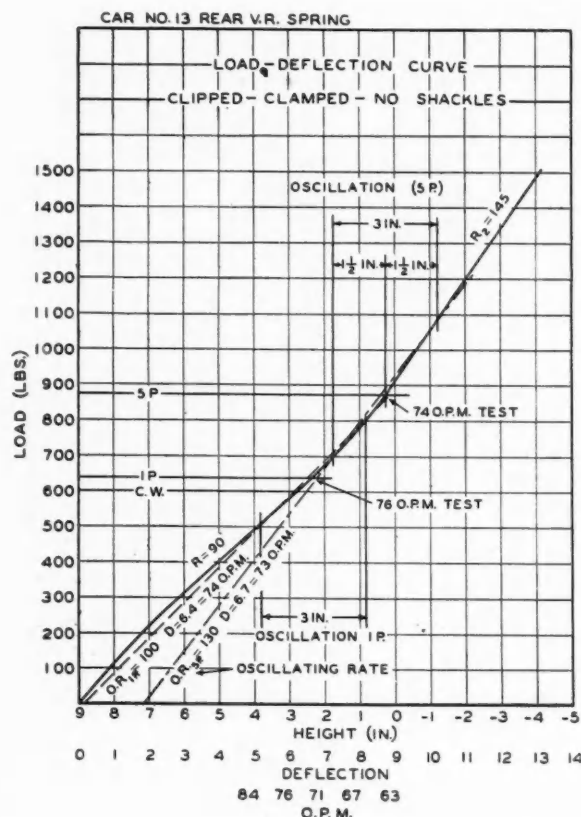


Fig. 8—Determining "oscillations per minute" from rate curve of spring

dition. However, when the rate increase is greater than the load increase, we can more accurately compute the O.P.M. from the static deflection, as determined by the "average oscillation rate."

The average oscillation rate at any load is found by assuming 3 in. total amplitude of movement ($1\frac{1}{2}$ in. plus and minus) and projecting a line through these two points on the rate curve to the zero-load line. The required deflection can then be read directly from the chart, or can be found by dividing the load by the actual rate.

This method of determining O.P.M. is illustrated by an example in Fig. 8, which is a rate test of a rear spring with two units—one with a rate of 90 lb. per in. clamped, the other with 145 lb. per in. clamped, an increase of 61 per cent. At 5-passenger load, the calculated static deflection is found by dividing the actual load, 875 lb., by the rate, 130 lb. per in., which gives 6.7 in. The O.P.M. calculated from this deflection is 73. Actual tests show the O.P.M. to be 74. If we had used the actually measured static deflection of 8.8 in. the O.P.M. would have been 64. The same calculations for a 1-passenger load established a rate of 100 lb. per in. and a static deflection of 6.4 in. This deflection gives a calculated O.P.M. of 74, and the tests at 1-passenger load showed 76.

The mathematics of pseudo-harmonic vibrations, as found in variable-rate springs, are thoroughly discussed in Timoshenko's "Vibration Problems in Engineering."

Following are the advantages offered by variable-rate springs:

1. Riding comfort appears to be fundamentally governed by frequency, or O.P.M.s. The variable-rate spring enables us to obtain the same frequency with a 1-passenger load that we previously had with five, without the former disadvantages. The "5-passenger" frequency may be made lower, higher, or the same as the "1-passenger" frequency, as desired.

2. Owing to the increase in stiff-

ness with deflection, the roll tendency, stability and bottoming can be controlled. The torsional stiffness of variable-rate springs, like that of conventional leaf springs, gives an additional resistance to roll, which coil springs lack.

3. The variable-rate spring appears to reduce axle dance greatly.

4. As control by hydraulic shock absorbers varies with the square of the velocity, the constant oscillations per minute tend to simplify control for varying loads. Also, test curves indicate that less energy absorption is required from the shock absorber.

5. The build-up stiffness on compression makes it possible to greatly reduce the compression control on the shock absorber. We ride the spring and not the shock absorber, which greatly improves the "boulevard ride."

6. If the average rate is increased over conventional design from curb weight to five-passenger load, the change in body height can be minimized.

Our tests all showed what we con-

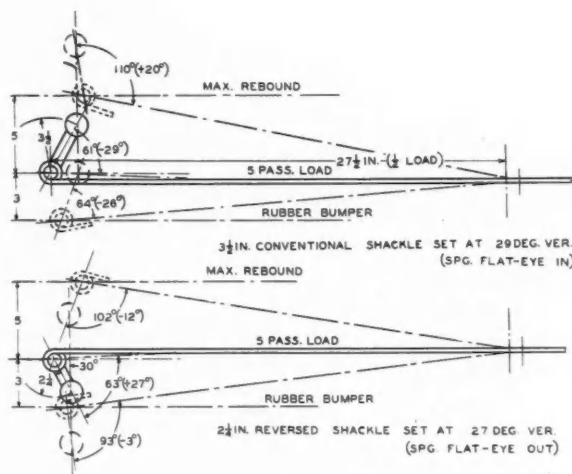


Fig. 9—Illustrating angle variation

EFFECT OF VARIOUS SHACKLE ANGLES ON OSCILLATIONS PER MINUTE O.P.M.

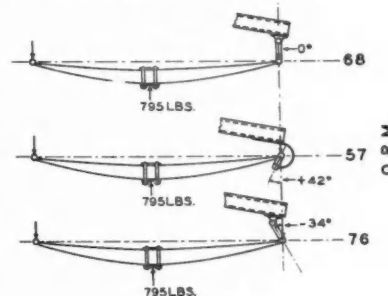


Fig. 10—Showing effect of shackle angle on "oscillations per minute"

sider to be an excessive reduction of the static deflection and increase in rate, when the leaf spring was mounted on the car. Some interferences with natural spring frequency were found to be caused by spring seats, shackles, shock absorbers, and radius rods.

We first ran tests to determine the effect of spring seats. These indicated a loss of deflection of 10 per cent to 17 per cent, depending on the effective length of the seat and the length of the spring. Rubber spring seats reduced these losses.

We next decided to test the effect of shackle angles on rate and oscillations per minute. Some data on the effect of the rate were available, but none of the effect on frequency. In Fig. 9, the upper illustration shows the position of the shackle on the car at maximum deflection, normal load, and maximum rebound. The standard compression shackle is shown in the top illustration, and a reversed tension shackle at the bottom. The angle between the center line of the shackle and a line drawn from the center of the eye to the center of the main leaf continually changes. This angle controls the forces in the main leaf. The reversed shackle is shown with eye "out" in-

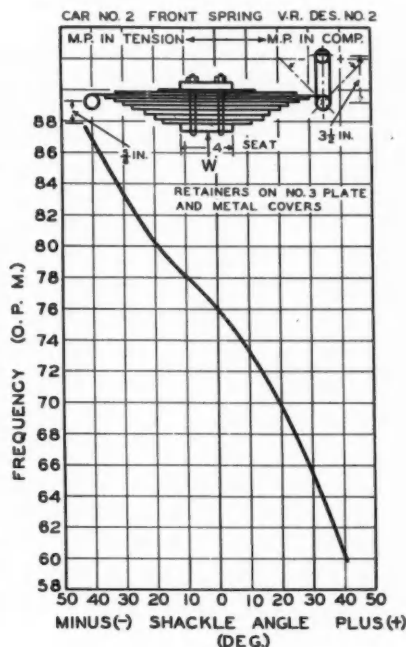


Fig. 12—Curve of oscillations per minute vs. shackle angle for front spring

force changes to a compressive force in the main leaf, lowering both the rate and the frequency.

We first tested a variable-rate rear spring (Fig. 10) for O.P.M., changing the tension shackle from 0 deg. to minus 34 degrees and then to plus 42 deg. (A minus angle is one which puts the main leaf under tension; a plus angle one which puts it under compression lengthwise. At 0 deg. angle the spring had 68 O.P.M.; at plus 42 deg. it had 57 O.P.M., and at minus 34 deg. it had 76 O.P.M., a total change of 19 oscillations per minute. Fig. 11 shows the effect of intermediate shackle angles on the O.P.M. Fig. 12 shows tests on a 37-in. front spring with a compression shackle. The O.P.M. was 76 for 0 deg. shackle angle, 87 for minus 41 deg., and 60 for plus 40 deg.

Fig. 13 shows a variable-rate rear spring of three-unit design which, on rollers (curve B) showed a rate, with a 1-passenger load, of 90 lb. per in.; with a 5-passenger load, of 115 lb. per in., and at the bumper

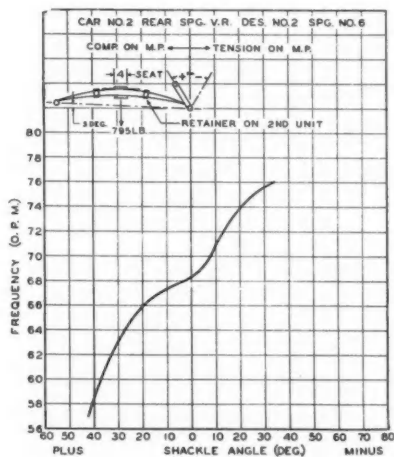


Fig. 11—Curve of oscillations per minute vs. shackle angle for rear spring

stead of "in." This gives better rate control, as will be explained later.

With a conventional compression shackle there is tension in the main leaf, which increases the rate and the frequency. With the shackle in the reversed position, this tensile

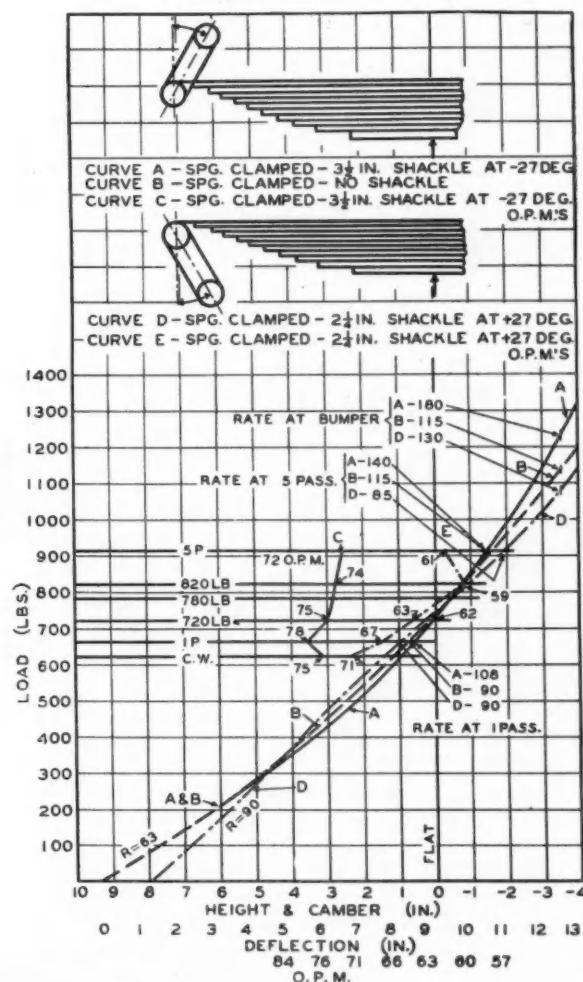


Fig. 13 — Rate curves of a three-unit variable rate rear spring

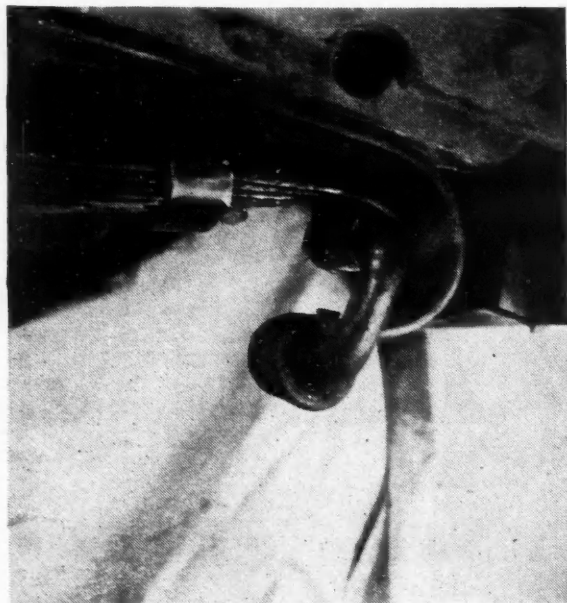


Fig. 14—Arrangement of reverse shackle

contact, of 115 lb. per in., the increase in the rate being 27 per cent.

Curve A shows how these rates increase with a standard compression shackle $3\frac{1}{2}$ in. long, set at a minus 27 deg. angle. The rate at 1-passenger load is 108 lb. per in.; at 5-passenger load, 140 lb. per in., and at bumper contact, 180 lb. per in. Curve D shows the effect on the same spring of a $2\frac{1}{4}$ -in. reversed tension shackle set at a plus 27 deg. angle. Here at 1-passenger load the rate is 90 lb. per in.; at 5-passenger load, 85 lb. per in., and at bumper contact, 130 lb. per in. The shorter the shackle length, the greater the angle change and the greater the rate build-up.

This particular spring was designed to operate on a standard compression shackle, and the lower rate at the rubber bumper contact shows the necessity, where reverse shackles are used, of a greater stiffness in the last unit. Note that the O.P.M. varied from 78 at the curb weight to 72 at 5-passenger load. With a higher rate third unit the O.P.M. will be more nearly uniform.

With the eye "in," there will be a loss of rate at the rubber bumper position, due to the geometry of the eye movement. With the eye "out," the controlling shackle angle approaches zero, thus restoring the loss of rate. From the geometry, the reverse shackle would appear to build-up the rate from flat-spring position to bumper contact, while the conventional shackle shows less change in shackle angle from flat position to bumper contact, and, therefore, produces less rate build-up under the same conditions. (See Fig. 9). Our tests on this spring

coil springs the results were very satisfactory, on cars with front leaf springs the ride was unbalanced, due to the increased softness made available at the rear by variable-rate design.

A few years ago, 4 to $4\frac{1}{4}$ in. static deflection was the limit for leaf-type front springs, due to shimmy, bad steering and general instability. At present, with improved steering geometry and better wheel balance, 6- to 7-in. static deflection is not uncommon.

As we were obtaining oscillations per minute in the sixties on the rear, it appeared necessary to use 9 to 10 in. static deflection on the front to get a "balanced ride." The doubtful point was whether shimmy and steering troubles would develop.

Fig. 15 is a spring-rate curve of a conventional front spring on the

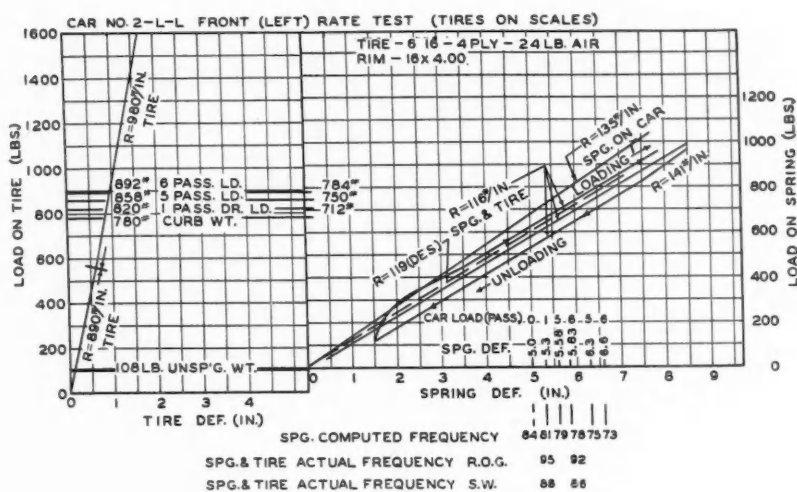


Fig. 15—Rate curves for a conventional front suspension

show that with eyes "out," the rate builds up 53 per cent with a reverse shackle, as against 28 per cent with a conventional shackle.

Fig. 14 shows the mounting of a reversed shackle on the car. A leaf spring hanger designed for low unit stress is secured to the side rail, the weight and cost being about the same as with the present construction.

It may be possible to build lighter and cheaper springs by lowering the designed rate through changing the shackle angle, for the higher the designed rate of the spring, the lower its weight. This subject is very important and deserves further investigation.

On applying the variable-rate spring to the rear of various 1938 cars, we found that, while with front

car. This spring had 6.3-in. static deflection and a rate of 119 lb. per in. as designed, but on the car these figures became 5.6 in. and 135 lb. per in.

Fig. 16 shows the variable-rate spring which replaced it. It was mounted with a plus 30 deg. shackle angle. At the 1-passenger position the rate starts to change from 100 lb. per in. and builds up to 190 lb. per in. at one inch past the 5-passenger deflection—a 90 per cent increase. The O.P.M.'s were 72 at curb weight, 74 with one passenger and 76 with five passengers. This constant frequency is due to the large rate of build-up.

We have equipped a number of cars with variable-rate springs at both front and rear. In general, the steering was not affected. Cars free

from tramp, shimmy and wheel fight with conventional springs, gave the same results with variable-rate springs. Cars which formerly suffered from these troubles still retained them. By correcting wheel balance and steering geometry (which in some cases is affected by the application of variable-rate front springs), these troubles were eliminated or minimized.

In general, we believe that with proper front-spring lengths and widths it is possible, with variable-rate springs, to obtain approximately the same frequencies and steering as with coil springs, and to secure the following advantages:

1. Greatly reduced brake-nosing.
2. Increased stability.
3. Decrease in side roll.
4. Decreased bottoming.
5. Reduced car weight and cost.
6. Less shock absorber impact control.

One of the objections to low-rate front springs is "brake wrap-up." The "build-up" in variable-rate springs reduces this materially. Our tests with standard springs showed 10 to 14 deg. axle twist when sliding the wheels. With proper steering geometry this does not affect the steering seriously, but causes considerable local stress in the rear of the spring.

Fig. 17 shows a construction which adds little cost and weight, and which has been under test with apparently good results. It is simply a parallelogram formed by the main leaf and one extra half leaf at the rear end. The plate is figured into the capacity of the spring and adds very little ineffective weight. The distance between the two torque

members is necessarily small, which results in high momentary loads on the pins. As with the shackle in front the torque plate tends to buckle, one or more rubber struts are fixed to the clips.

No slippage has yet been observed at the spring seat. This construction reduces the wrap-up about 50 per cent, or to about 7 deg., and increases the front-end stability considerably. It has been built both with and without kick shackles. Rubber bushings with at least 5/16 in. wall appear desirable where no kick shackle is used to minimize road shock to the wheel. It was found advisable to use screw bushings on the right side.

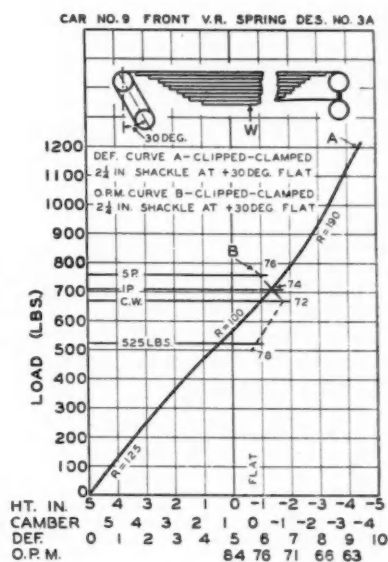


Fig. 16—Rate curve of variable-rate spring which replaced the conventional design of Fig. 15



Fig. 17—Torque member for use in connection with low-rate front springs

As we appear to need substantially the same static deflection in the front as in the rear, it would seem advisable to use longer front springs than heretofore. Increasing the length offers the following advantages: (1) less change in length with changing deflections, and consequently less effect on steering geometry; (2) less angular "wrap-up," since a given deflection from torque reaction is effective over a longer beam; (3) greater "column strength" in the main leaf and stronger eyes, for longer springs allow the use of heavier gages of steel; (4) economy through lower cost of steel, since the heavier gages do not call for "extras" applicable to excessively thin sizes.

Longer springs do not weigh any more, for the number of pounds of spring steel required is determined fundamentally by the load carried, and the deflection and stress due to that load. Theoretically, for a given load, with equal deflection and stress, the weight of a leaf spring is constant, regardless of length or width.

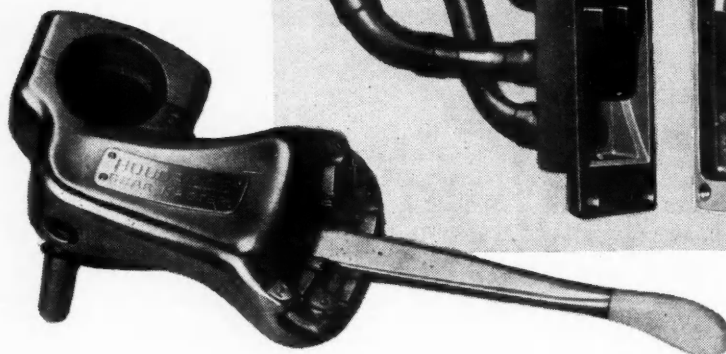
We also feel that consideration should be given to increased spring widths, within practical limits. As transverse spring deflection (edge-wise deformation) varies as the cube of the width, a change from 1 3/4 in. to 2 in. width would increase the transverse strength factor about 50 per cent; also, the eye strength would be increased about 15 per cent. Wider springs have fewer leaves, which might reduce the cost. Obviously, lateral stability of front springs at high speeds is a matter of considerable importance.

While there appears to be two schools of thought as regards riding characteristics, in our opinion the ultimate objectives of both are the same, in that they both desire comfort, safety, and stability. One school is willing to sacrifice some riding comfort for increased stability and safety. Both schools know that slower accelerations give increased riding comfort. If this increased riding comfort can be obtained without sacrifice of stability and safety, both will have secured their objectives. It is our belief and hope that the work we have done will contribute helpfully toward this end.

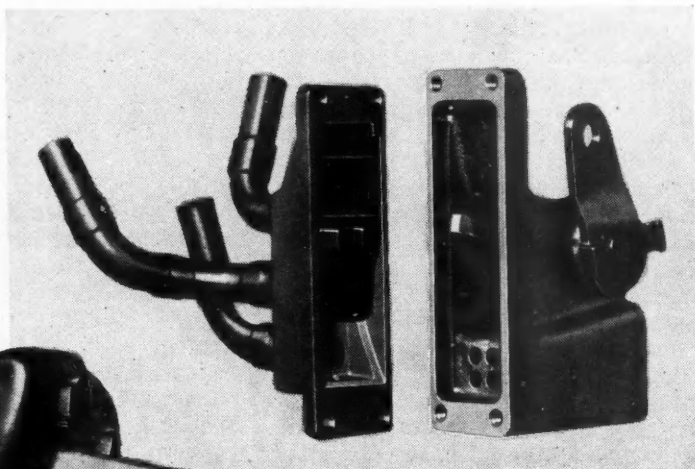
Correction

In the article on Leaf Springs (Part 1), by J. H. Shoemaker in *AUTOMOTIVE INDUSTRIES* of June 25, in the caption under Fig. 11, the last two lines should read "main leaf to compression (2 and 3) or tension (1 and 4)."

Preselective Gearshift



Selector lever of Houdaille Gear-Master, which is mounted on the steering column under the wheel.



Slide valve of the power unit, opened up

A NEW preselective gear-shifting mechanism, specially designed for installation on trucks and buses, is now being offered the industry by the Houde Engineering Corporation, the Buffalo subsidiary of the Houdaille-Hershey Corporation, under the trade name of the Houdaille Gear-Master. It is claimed to be of simple design, easy to install, to facilitate gear control, to reduce wear and tear on the shifting mechanism, and to contribute toward safety of operation. The device lends itself particularly to installation on the modern type of bus with rear-mounted powerplant, and to the cab-over-engine type of truck, as no wires or complicated linkages are required.

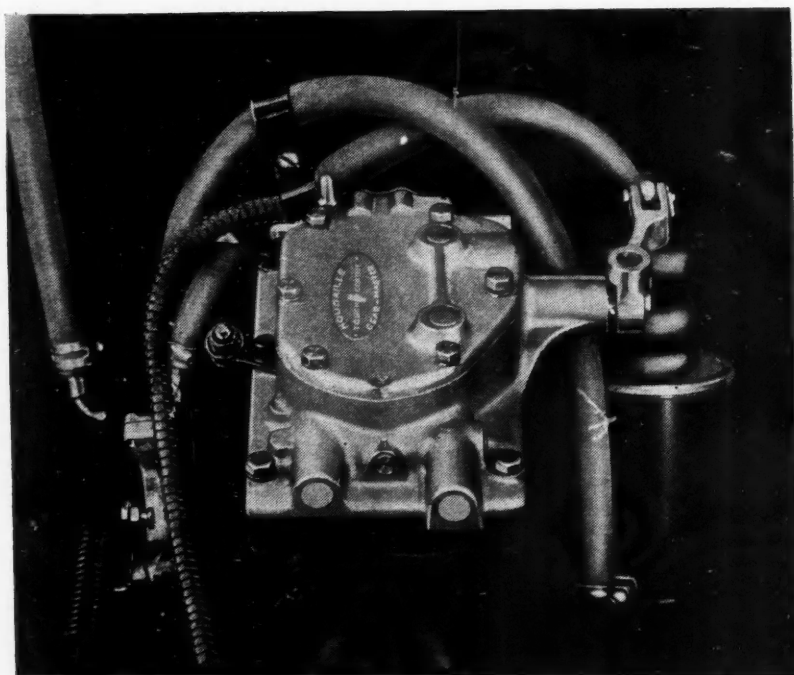
The driver can preselect the gear into which he wishes to shift without removing his hand from the steering wheel. The selector lever operates in the same H-type quadrant as the conventional shift lever. Gear selection may be made either before the clutch is released or after, the actual shifting of gears being accomplished by a vacuum-operated piston which is set in motion as the driver releases the clutch pedal. A

special advantage of this type of control for buses is said to be that the driver's right hand is left free for other duties, such as closing doors, collecting fares, handing out transfers, etc.

The device consists of four units, viz., (1) the selector lever on the steering column directly below the steering wheel; (2) the selector mechanism located on the transmission and replacing the cover plate thereof; (3) a self-lubricating slide valve mounted near the transmission and actuated through the intermediary of the clutch pedal, and (4) the vacuum-power cylinder, mounted adjacent to the transmission.

In remote-control installations, as in the rear-engined type of bus, a sheathed, airplane-type control cable, which is said to be virtually free from backlash, connects the mechanism with the driver's control. Selection of a speed by the selector lever places certain parts into position to be operated by the vacuum piston when the shift is required. The downstroke of the clutch pedal automatically throws the gears into neutral, and the actual shift takes place only during the return stroke of the pedal, which is claimed to prevent clashing of the gears.

(Turn to page 63, please)



This view shows three of the four units of the Gear-Master—the control valve on the left, the shifter mechanism on top of the transmission in the center, and the vacuum cylinder on the right.



Plymouth main bearing caps pass through broaching "tunnels" on these machines that finish two sides ready for assembly. Automatic fixtures lock them in place as they enter and release them onto a conveyor belt when finished.

Production Lines

and Fifth Avenue double-deck motor coaches of recent vintage. Report on mileage to date is being prepared. However, an early report, Oct. 1, 1937, from Chicago Motor Coach Co., advises that buses equipped with Mono-Drive were averaging gasoline mileage consistently better than 6 per cent over identical buses with conventional power transmission units in same service. This report represents first-year operation of 100 new coaches.

Few Shocked

Minor but nevertheless troublesome problem of current automobile engineering is the matter of static electricity phenomena. Only a few cases of this condition are brought to the attention of the factories but each of these becomes a mighty tough job to lick. We have made only a cursory survey of the situation, learning only that the problem exists, something about the theories that have been evolved, and a few practical slants on what may be done. Apparently what makes the situation so difficult to handle is that it pops up in just a few cases and is difficult to produce at will for purposes of scientific study. We have some ideas and would like to receive the benefit of individual studies so that more light may be shed in the interest of everyone. May we have your cooperation.

Conditioned Air

Prominent research organization tells us quite confidentially that they have developed a special solution refrigeration cycle which is even now undergoing scientific investigation at one of our leading institutions of learning. It is, basically, a closed thermal circuit. For this reason the principle could be applied most economically to passenger cars and buses. This organization does not specialize in the commercialization of

cooling systems or refrigeration. However, we have the privilege of providing a contact between this group and anyone interested in the development of air-conditioning systems for automobiles.

Chassis Lubes

Fruit of your scribe's paper on the lubrication of special running gear mechanism, presented at White Sulphur Springs, was indication that several major oil companies have carried on a program of simplified chassis lubricants for some time. Comprehensive report just received from C. M. Larson of the Sinclair Refining Co., shows how far they have succeeded in simplifying their line of lubes. Not only does Sinclair standardize on but a few chassis lubes, but they have only one grease for front wheel bearings, universal joints, and distributors. So far, the arrangement is said to have worked out most satisfactorily on passenger cars and light trucks. Factory engineers please note.

More Miles

Discussion at White Sulphur Springs on gasoline mileage with an automatic transmission carried our little investigation to the New Products Corporation, designers of the "Mono-Drive" automatic transmission, standard equipment on Chicago

High Tension

Important ignition cable manufacturer is bringing out a new high tension cable using small-gage stranded steel cable instead of the conventional copper. They use stainless steel for its special properties of resistance to heat and corrosion, as well as for its plus strength. With a small metal core the dielectric properties of high tension cable are vastly improved. Moreover, its conductivity is affected much less by increased temperature under the hood. Simple test apparatus has been used to show the improvement in character of the spark at the spark plug gap under extreme conditions of high speed and low speed, where some copper leads have a tendency to fail. This cable seems to hold great promise for heavy duty equipment such as buses and trucks, also for aircraft, and higher-priced motor cars.

Small Diesel

Understand that famed Diesel engine builder is to introduce a small four-cylinder Diesel engine some time this summer. Contemplated, too, is the production of an improved injector—for which much new equipment is being installed. Sorry that we can't tell you more at this time.—J. G.

Pneumatic Micrometer Developed in France

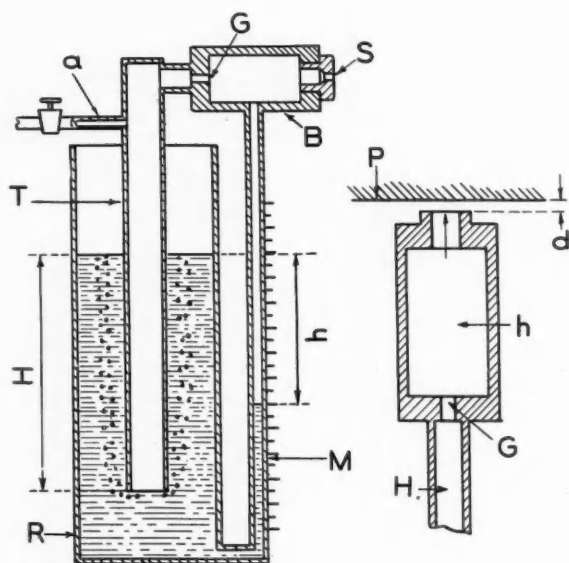


Fig. 1—Section of Solex pneumatic device for calibrating carburetor metering orifices and detail of the pressure chamber with standard and test nozzle.

A PNEUMATIC micrometer has been developed in France by M. Marcel Mennesson of the Solex Carburetor Co., a by-product of development work on means for calibrating carburetor nozzles. After numerous other methods had been tried, the following was found to give the most satisfactory results (Fig. 1): The nozzle (or metering orifice) *S* to be calibrated is connected in series with a standard orifice *G*. A special device to which the name "pressure reducer" has been applied, and which functions on the same principle as the overflow device in producing a constant hydraulic pressure, gives an absolutely constant air pressure *H* from any convenient source of compressed air. Under these conditions a pressure *h* is produced between the orifices *G* and *S* which varies in inverse ratio to the size of *S*, *G* being constant, and thus permits of measuring or calibrating *S*. As a matter of fact, the pressure gage *M* of the calibrating instrument is provided with a scale which shows the diameter of the orifice directly. The method is said to be very accurate and to permit of determining the delivery of the metering orifice within limits of plus 1 and minus 2 per cent.

Impressed by the accuracy of the results obtained in these calibrating operations, it occurred to M. Mennesson that the same method might be applied to mechanical measurements. To this end, the outlet of orifice *S* is made in the form of a large orifice which is brought within a short dis-

tance *d* of a movable plane *p* (Fig. 2). Under these conditions, the area of the outlet is no longer that of the circular orifice *S*, which is referred to as the measuring orifice, but that of a small annular ring of height *d* and constant circumference. It will be readily understood that if this orifice or jet is put in the place of the orifice to be calibrated in the preceding case, the pressure *h* which develops depends solely on the distance *d*. Other things being equal, it varies more the greater the cir-

cumference *S* for a given change in *d*. This at once makes evident the possibilities for amplification inherent in this method. In practice, the plane or disc *p* is rigidly connected to a diamond point which contacts the piece to be measured. The test piece, moreover, rests on a marble table, or, more generally, is held in a fixed position relative to the measuring orifice. Under these conditions, any variation in the dimension of the parts inspected is translated into a smaller or greater opening of the measuring orifice, and this can be readily measured. In this way a comparator is produced by means of which (in the model developed for checking gages) it is possible to measure to 1/10 and even 1/100 of a micron. (0.01 micron = 0.000,000,4 in.)

In the method just described, a hard point comes in contact with the piece to be measured, and this point, however hard it may be, is subject to wear, which necessitates a periodic recalibration of the apparatus if it is used intensively. This not only occasions a loss of time, but also leaves a good deal to the per-

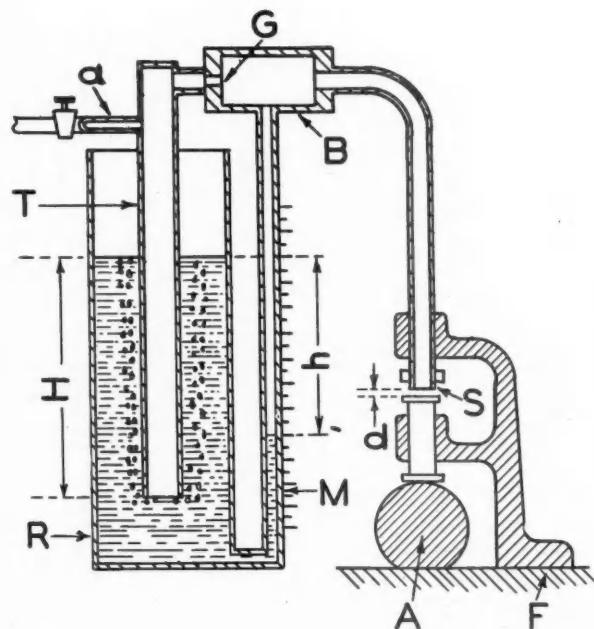


Fig. 2—Diagram of Solex pneumatic micrometer as used in measuring the diameter of a cylindrical part

sonal judgment of the inspector, who, therefore, must be a skilled person. This was not considered a good industrial solution of the problem.

It was therefore sought to eliminate this last chance of error, that is, all contact between the piece to be measured and the orifice piece or nozzle. In order to fix ideas, let us consider the case of a cylinder bore. A plug (Fig. 3) is provided at its ends with two measuring orifices *S* and *S'* which discharge directly against the surface to be measured. The area of the free passage depends solely on the clearance between the orifice plates and the bore, and as the distance between the orifice plates is known, the air pressure *h* in the pressure reducer connected to the plug gives directly the diameter of the bore. The two orifices *S* and *S'* have absolutely equal diameters, which makes the sum of the two sections determinable, and also the sum

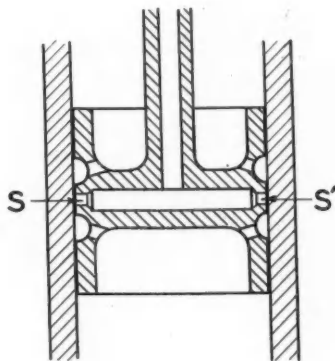


Fig. 3—Section of a plug for measuring cylinder bores.

of the individual distances between the orifice plates and the surface of the bore. On the other hand, as it is not necessary that the orifice plates should come in contact with the surface of the bore, things are so arranged that they never come in con-

tact with it, by sinking them slightly below the surface of the plug. There is, therefore, no wear on the measuring surfaces, and the accuracy is said to be fully maintained during the life of the instrument, which may cover several hundred thousand measurements or inspections. For outside measurements the plug is replaced by a ring. The principle has been applied also to extensometers.—*Journal of the (French) Society of Automobile Engineers*, March.

The Solex pneumatic gage, described here, is handled in this country by the Pneumatic Gage Co., Shoreham Bldg., 15th and H Streets, N.W., Washington, D. C. In addition to being used for checking internal and external diameters of mechanical parts, the instrument can be used also as a flowmeter, to check the effective diameters of carburetor nozzles, fuel injection nozzles, etc.

Cooling Systems Have Conflicting Requirements

WITH the present rapid progress in the horse-power output of aircraft engines, few design problems are permanently solved, and the manufacturer is continually conducting research, design, and tests to overcome potential limitations to his next advance. Cooling may well be considered one of the most persistent of all such limitations, and is, therefore, one to which the manufacturer gives continuous attention. There are really two conflicting requirements which must be met in the design of the cooling system, and both of these are getting more severe as engine powers and airplane speeds increase from year to year. These requirements are an increase in the rate of waste-heat transfer from the engine, and a decrease in the cooling drag. Kenneth Campbell, project engineer of the Wright Aeronautical Corporation, in a paper presented at the S.A.E. summer meeting, discussed the subject of "Cylinder Cooling and Drag of Radial-Engine Installations."

Mr. Campbell divided the drag chargeable to cooling into three parts, viz., the pressure required to force the cooling air through the cooling passages, loss due to collecting air and returning it to the slip stream, and the loss resulting from overcoming the external drag of the engine installation which is in excess of the loss due to a perfect streamline shape of the same diameter, insofar as such deviation from

streamline form was made to improve the cooling.

The first of the foregoing items, the internal air-drag horse power, which is probably the most important of the factors affecting the cooling drag, can be simply represented by the equation:

$$\text{Int. Air-Drag Hp.} = \frac{\text{Vol. (cu. ft. per min.)} \times \text{Pressure Drop (Lb. per Sq. Ft.)}}{33,000}$$

or

$$= \text{C.F.M.} \times \text{In. of Water Column} \times 0.000157 \text{ Hp.}$$

Mr. Campbell discussed the cooling and drag problems from every angle and presented a good deal of experi-

mental data bearing on the subject. He reached the conclusion that although considerable progress has been made in cylinder cooling of radial aircraft engines, practice has not yet approached the point of diminishing returns. As in the past,

improved installation will result from a high degree of cooperation between the engine and the airplane manufacturer.

Preselective Gearshift

The selector lever may be moved from any one position to any other, regardless of the position of the clutch pedal. If the driver has selected one gear he may, if he wishes, move the lever to another gear position before allowing the pedal to return. Owing to the design of the valve, which brings the gears into neutral when it is in the depressed position, the Gear-Master can be applied equally to both synchronized and non-synchronized transmissions, with which latter double declutching is desirable. On the return (engaging) stroke of the pedal, the driver can skip the shift into gear. If the shift is into a lower gear, the en-

gine may be accelerated and the pedal depressed a second time, which completes the shift.

Little maintenance is said to be required by the device. Wear of the clutch facings does not affect the valve adjustment, and about all that is required is to lubricate the vacuum piston at intervals.

When a Gear-Master is fitted, the conventional shift lever is eliminated, and this leaves the driver's compartment free of obstructions. The device, which is being manufactured under Randol patents, already has been installed for trial by a number of bus and truck manufacturers.

(Continued from page 60)

Car Sales Weakened by Too Many • Hypodermics?

(Continued from page 50)

solve its used car problem, its problem of stabilizing output, or any of the many other ills that beset it at this time, it will get nowhere without consideration of the basic problem of the consumer's capacity to pay. This is the heart of it all. Real wages and national income are realities.

If credit terms are made more strict and pressure is applied to maintain a high rate of sales, the situation will become intolerable. The capital burden upon consumer and dealer will reach the breaking point, if, indeed, it hasn't already done so.

The alternative will be to sell on


long terms to ease the capital burden, but this will not be simple to accomplish. The small, independent finance houses will be unable to lower their rates and operate profitably, hence business will gravitate to the more amply buttressed concerns. But the larger companies will wish to take only the good risks and there will not be enough to go around and permit the dealers to get a profitable operating sales volume. So, ultimately, the manufacturer will have to take over the financing of his own product.

Two things can result from such a seemingly drastic step; both would be healthy. The manufacturer will be "carrying the bag" hitherto born by the dealer, and the profit will go out of financing. This will clarify a current misconception—that profits are to be made both from manufacture and financing—and financing will assume its rightful place as an agency of distribution and not be an end in itself.

But wait! When this point is reached it will be found that other profound changes will have to be instituted. The emphasis on yearly models will have to be subordinated and the public encouraged to retain its motor cars for the duration of their life, just as it does other articles of consumption with which the automobile should now be classed. Permanency must be given to ownership or the used car volume will expand to create further dislocation. Of course, this will lead to a smaller annual output, but through no other means can stabilization be achieved in the manufacturing process. The only offsetting factor would be a sharp reduction in initial cost, but reductions must be made slowly to maintain an equilibrium with the used car market.

When the industry has taken all these steps, it will be in a position to make one further adjustment. In can come out in the open with a rental proposition. It is in the rental business today, lacking all the arrangements to make it economically sound, but these steps would prepare the way for legitimacy.

Perhaps these are discouraging middle-aged thoughts, but there can be no other healthy thoughts for an industry which has attained middle life. It is inescapable that when growth is no longer possible and the artificial stimulus of instalment selling has run its course, provisions for the new status must be made. These can come only by adjustments to the consumer who, in the aggregate, represents the market.



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that keep
pace with
Industry's
demands.

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